

**CENTRUM  
NAUKI  
KOPERNIK**



**Annual Report 2021**

**Strategic Goals**

To ensure a top-quality experience to a safe number of visitors and to an online audience.

*To maintain the availability of exhibitions, planetarium and laboratories by flexibly shaping what we offer.*

*To open new exhibits, exhibitions, and experiments in the Copernicus Science Centre building and its environs.*

*To provide local communities with exhibitions and activities.*

To support the development of competencies for the future.

*To develop a networked learning community.*

*To encourage exploratory behaviours in visitors and people participating in other activities.*

To mobilize people around important science-related topics.

*To promote evidence informed practice and attitudes.*

*To inspire and lead dialogue on global and local challenges at the intersection of science and society.*

To provide funding for activities and development.

*To increase income from fundraising and from products and licensing sales.*

*To secure specific purpose grants for carrying out the most important projects.*

To ensure space for R&D activity and offices.

*To build and outfit the building of the Copernican Revolution Lab.*

To ensure continuous operations, agility and development potential.

*To build a committed team, tailored to CSC needs and capability.*

*To increase the efficiency of implementation of institutional goals.*

**Vision**

People shape a world that is friendly to them and to nature, by developing and applying science.

**Mission**

We inspire people to experiment, understand the world, and take responsible action.

**Values**

We value science, freedom, responsibility, trust and co-operation.





The public is back at Copernicus! We almost doubled our forecast attendance!



The exhibition "The Future is Today: Digital Brain?" was our most important premiere in 2021.



We demonstrate that online activities can be engaging and interactive.





We finalised construction work on the Copernican Revolution Lab.



Prof. Aleksander Wolszczan delivered a lecture at the planetarium marking Polish Science Day.



The first SOWA centres are up and running! They are in the towns of Piotrków Trybunalski and Racibórz.



We discussed the 'Future is Now' exhibition at the UN Digital Summit.





Pianist Leszek Możdżer performed at the planetarium as part of our celebrations of the centenary of Stanisław Lem's birth. The concert was streamed online.



How do you convince someone to wear their mask correctly? She knows!



The OSATeam was the winner of the Polish and European editions of the 2021 CANSAT competition.



The High Voltage Theatre made its big come back on Tesla Day! After a six-month break due to pandemic restrictions, we were once again surrounded by electric discharges from the Van de Graaff generator.



# To ensure a top-quality experience to a safe number of visitors and to an online audience.

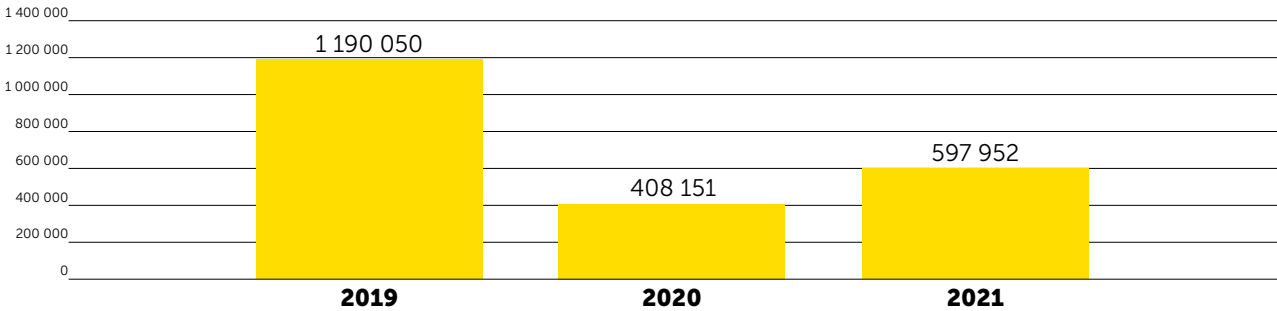
We assumed that we would receive 330,000 visitors in 2021. However, despite two lockdowns, sanitary restrictions and no school trips during the first six months, we welcomed 598,000 visitors – almost double the expected number! It turns out that the public couldn't wait to return, and felt safe at Copernicus even during the pandemic. We worked hard to be ready for their return. In 2020 we coated all exhibits and surfaces with a photocatalytic film protecting against bacteria, viruses and fungi. We repeated the process the following year. We marked out routes for visiting to help guests maintain safe distances at our exhibitions, and streamlined the ticket refund process in case of further lockdowns.

Our first visitors were individual guests, mainly at weekends. School trips returned following the "Discover Poland" project launched by the Ministry of Science and Education, providing financial support for schools to visit museums, remembrance sites, cultural venues and institutions popularising science. We welcomed students from all over the country not just for their usual morning visits, but also in the afternoons.

A major challenge was posed by the shifting limits on numbers of visitors, especially when we were selling advance tickets and it turned out that we were expecting higher numbers than were permitted to take in. We also hosted an exhibition of unusual bicycles on the patio and encouraged visitors to try them out. In the summer we reopened the High Voltage Theatre and the Robotic Theatre. The vaccination programme also came to the rescue: from August we were permitted to admit vaccinated guests outside of the limits on numbers. We asked our guests for help to increase ticket sales: when visitors showed their COVID certificates at the ticket office, we were able to sell additional tickets. The drive was very well received.

Attendance levels at the Copernicus Science Centre in 2019, 2020 and 2021

Our plan to grow our visitor numbers assumed that we would welcome 330,00 guests in 2021. In fact we received 598,000 visitors. We are aiming to return to attendance level of a million visitors in 2023.

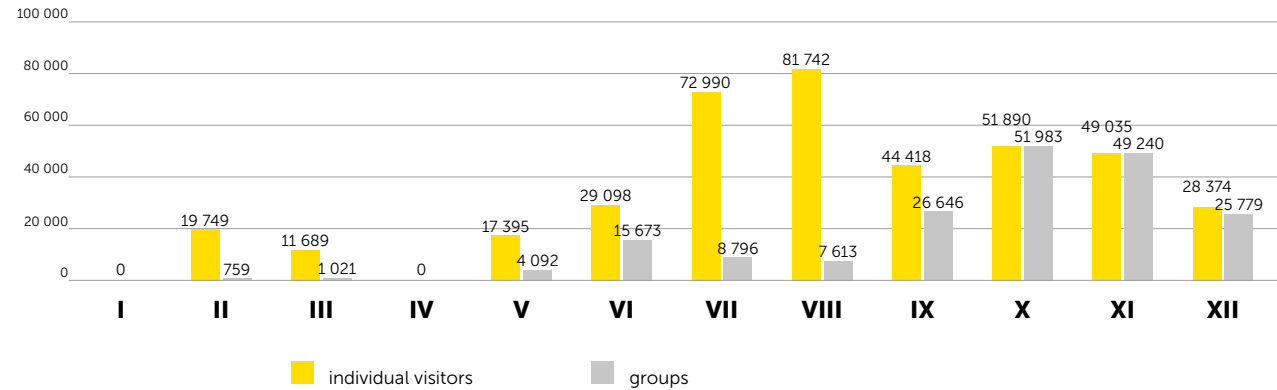


Attendance and limits on numbers of visitors at the Copernicus Science Centre in 2021

Last year was the second one of the pandemic. Copernicus was closed to visitors in January and April. When we were able to open to the public, we were required to adhere to strict sanitary restrictions and limited numbers of visitors to the exhibitions and the planetarium. Despite this, we still saw high attendance levels.

Due to the pandemic, we couldn't be certain whether we would have as many visitors during the summer holidays as in other years. In July, we saw the attendance levels double and visitor numbers remained high until the end of the year. October saw the highest number of visitors.

Visitor numbers for the Exhibitions and Planetarium taken together, broken down by individual vs. group visitors



Attendance by individuals and groups

In early 2021, concerns about COVID and the safety of students meant that schools rarely, if ever, organised trips. Group attendance levels did increase somewhat in June, likely due to emptier timetables before the summer holidays. As usual, the summer months saw fewer organised groups and more individual visitors. The number of school

trips rose again in early September following the launch of the “Discover Poland” programme launched by the Ministry of Science and Education. The programme provided financing for schools to be used towards organising trips. Another reason for the increase in group numbers was the drive to have school students spend time together after months of remote education, combined with concerns about another lockdown potentially on the way in late autumn. Groups started returning in September, with numbers exceeding our expectations in October and November. During these months, we were visited by as many groups as individuals.

Looking at the entire year, the ratio of groups to individuals was 32% vs. 68% (whereas the pre-pandemic ratio had been 35% vs. 65%).

Given that we missed out on the first six months (a peak time for group visits, when they usually comprise around half of all visitors), we are very pleased with this overall result. In the second six months, we saw more groups than in 2019, in particular in November when we sold 12,657 more tickets to our exhibitions than in 2019.

**Record attendance at the planetarium – the triumph of combined tickets**

In September 2020 we launched combined tickets providing entry to the exhibitions and the planetarium, and we started promoting them in 2021. The combined ticket is cheaper than buying two separate tickets.

Our promotional activities for the combined tickets boosted awareness of the planetarium and encouraged guests to visit both the exhibitions and the planetarium. The combined tickets increased attendance at the planetarium: over the course of the year we sold 131,874 tickets for 2D shows, 50.72% of which were combined tickets.

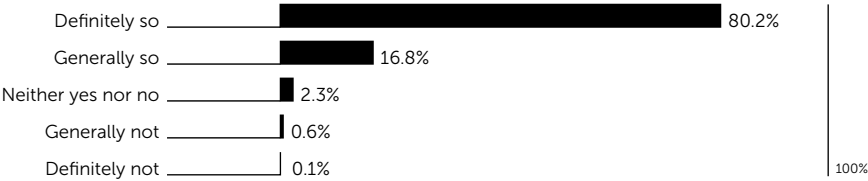
During our campaign promoting the combined tickets, we saw record attendance at the planetarium (in spite of limits due to the pandemic). In October, we welcomed 22,911 guests – the highest-ever number for the month of October since the opening of the planetarium (in 2016 we had 22,213 visitors and 22,869 in 2011).

Of all tickets to the planetarium sold in July, 62% of standard tickets and 61% of reduced-rate tickets were combined. In August, the numbers rose to 67% of standard and 65% of reduced-rate tickets. On the scale of 2021 as a whole, 51% of tickets sold to the planetarium were combined tickets. All in all, a great success!

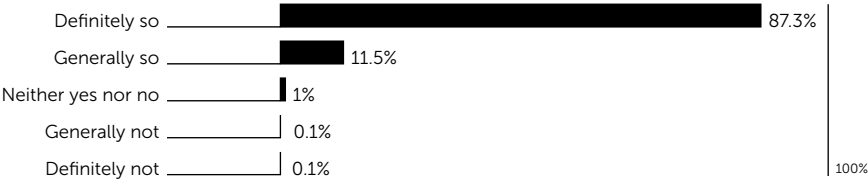
**Visitor satisfaction**

Our guests to the exhibitions and the planetarium are consistently satisfied with their visit. In 2021, 97% of visitors of the exhibitions and 98.8% of the planetarium reported they were “definitely” satisfied or at least “generally” so. Satisfied visitors are also likely to recommend us to their friends, with 85.8% stating they would “definitely” recommend us and 12.5% that they would “probably” do so.

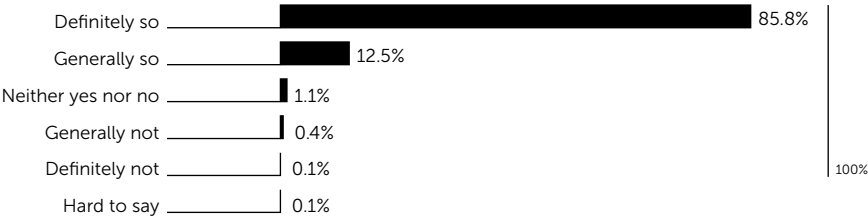
**In general, are you satisfied with your visit of the exhibitions at the Copernicus Science Centre?**



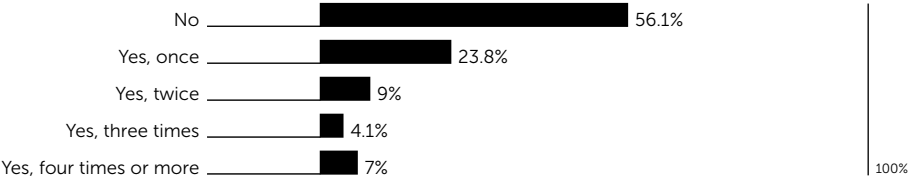
**In general, are you satisfied with your visit to the planetarium?**



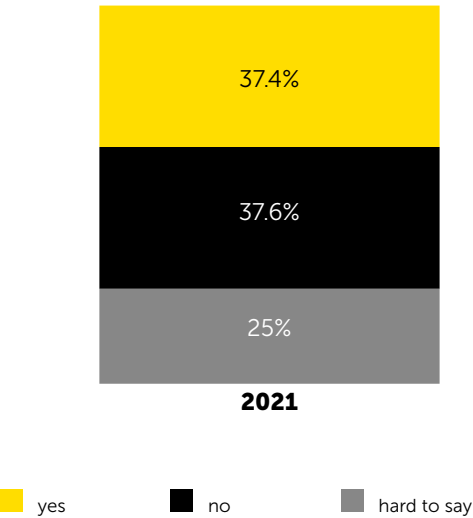
**Would you recommend visiting the Copernicus Science Centre to your friends?**



**Have you been to the Copernicus Science Centre before?**



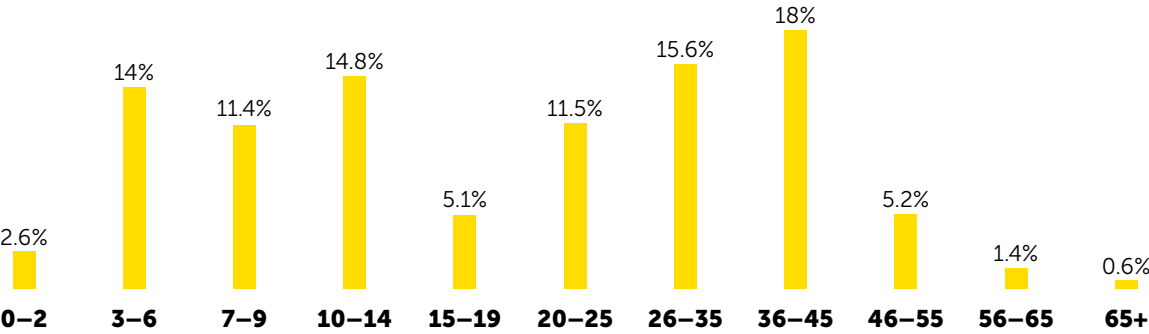
Do you intend to come bac to the Copernicus Science Centre in the coming 12 months?



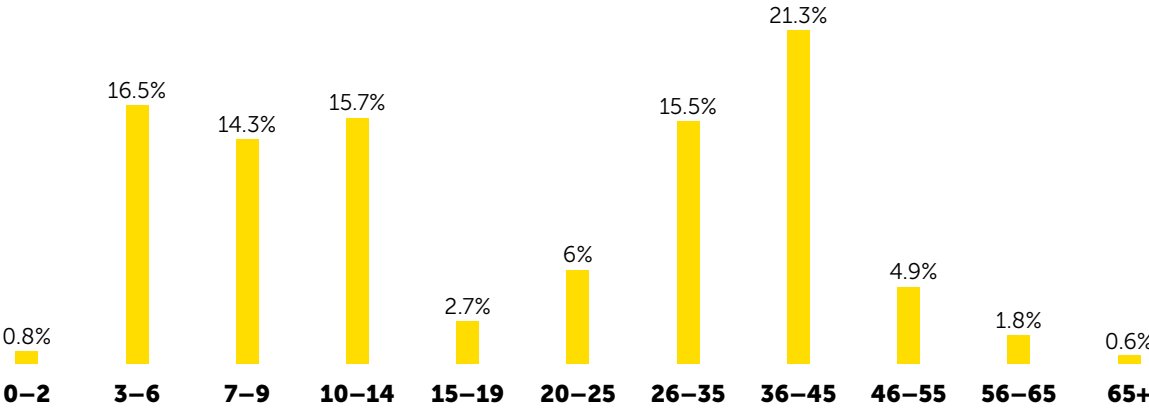
Our visitors

Due to closures, satisfaction surveys were conducted in 2021 between June and December. Visitor demographics in 2021 were similar to previous years, with women, people who had attained high levels of education and those below 45 years of age being the most frequent visitors. The age-breakdown of individual visitors to the exhibitions is very similar to previous years. The majority of our visitors are also still from outside Warsaw and the Mazowsze Voivodeship, while the number of local visitors at the exhibitions is similar to the previous year. There are significantly more local visitors to the planetarium than to the exhibitions.

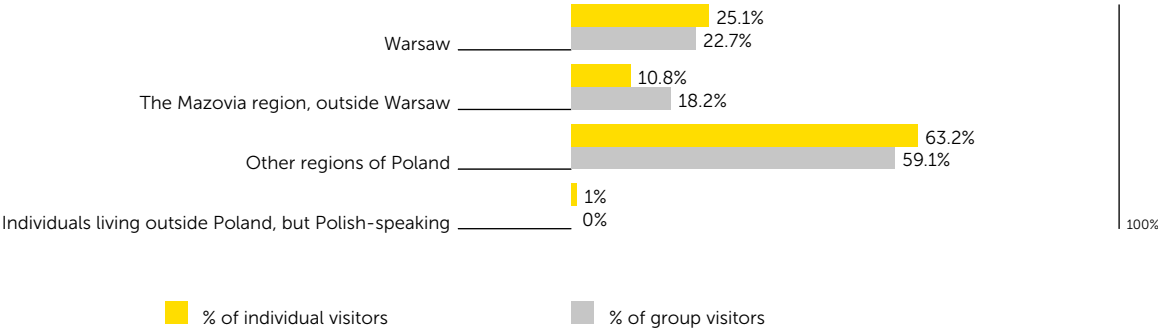
Individual visitors to the Exhibitions, broken down by age



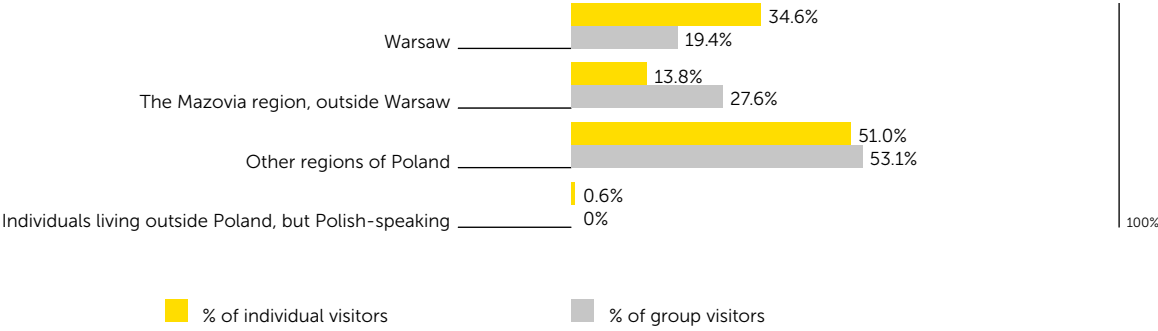
Individual visitors to the Planetarium, broken down by age



Place of residence of visitors to the Exhibitions



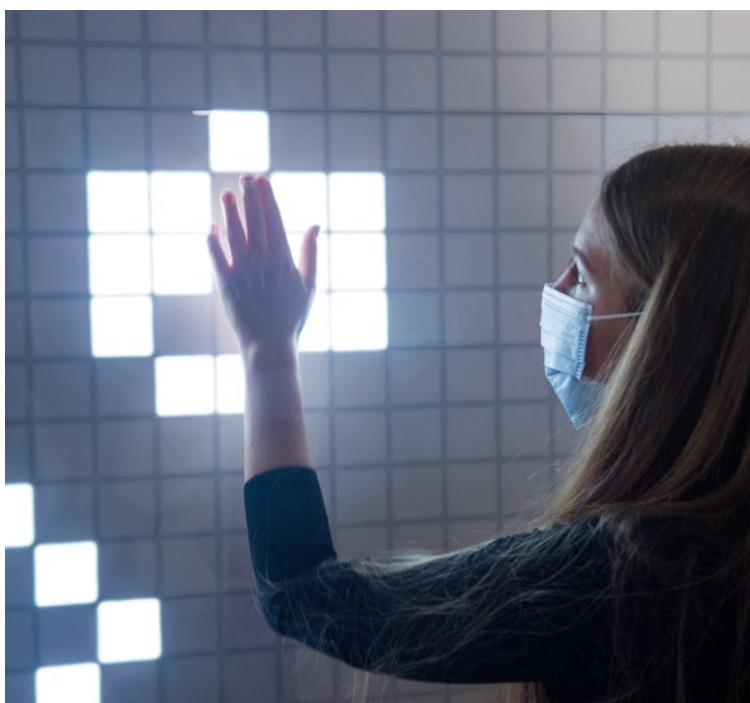
Place of residence of visitors to the Planetarium





# Exhibitions and planetarium

The majority of exhibits at Copernicus are experimentation stations where visitors observe scientific phenomena, modify how they proceed and observe the results independently. Our new exhibition “The Future is Now” is different. It asks questions which frequently don’t have straightforward answers. It encourages visitors to think about and become directly involved in shaping the world we are living in.



“The Future is Today: Digital Brain?” The exhibition opened to visitors on 5 November 2021.



The Experimentation Zone is Copernicus' main exposition space. It comprises almost 200 experimental stations devoted to nature and its phenomena as well as to mankind and our perception of the physical world.



The temporary exhibition “Bicycles” presents historic velocipedes, explores their workings and allows visitors to try their hand at some unusual models.



RE:generation was with us for 11 years. It has now given way to the exhibition “The Future is Today”.



The Buzzz! exhibition is our longest-running. Here our youngest guests can learn through play, driven by their natural curiosity. It offers a space for unrestrained exploration.



Dear Copernicus,

*I wanted to ask how I can pass on my thanks to the gentleman who delivered the introduction to the show at the planetarium at 12.30 on Sunday 20 June. Listening to him was pure joy.*

*Because I came to Warsaw especially to spend a couple of days at Copernicus with my son and two of his friends, we had also been to a show [at the planetarium] on the previous day at 2.30, and we were worried that listening to the introduction again the next day would be a "necessary evil" we'd have to listen to before watching the film. But the way the presenter captivated the audience... words fail me.*

*We remember everything from the lecture. OK, maybe not exactly everything, but our son – who came in assuming "oh no, it's going to be the same thing all over again" – announced at the end, "Hey, maybe I'll get a job at NASA!".*

*Please pass on my sincerest thanks to the host. He made a young man's eyes light up, and that's quite a challenge in today's world.*

*All the best,  
Ewa and Antek*

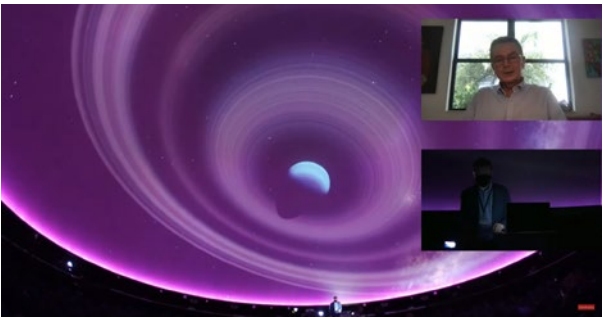
We are delighted when we receive letters like this one. They confirm that sharing our passion makes a difference and helps awaken people's curiosity. Visitors to the planetarium experience the vastness, complexity and beauty of our universe. Outer space is truly captivating. We see this time and again when we hear gasps from the audience during shows of the night sky. We take our guests on virtual interplanetary tours and tell them about the latest discoveries and stages of space exploration. We also discuss the impact humankind has on our planet. As well as shows of the night sky, we also host film screenings, laser and music displays, cultural and popular science events and meetings with scientists. The cycle "Straight from the Sky" is an opportunity to meet professionals studying the universe.

**Guests at the cycle "Straight from the Sky" and topics they discussed**

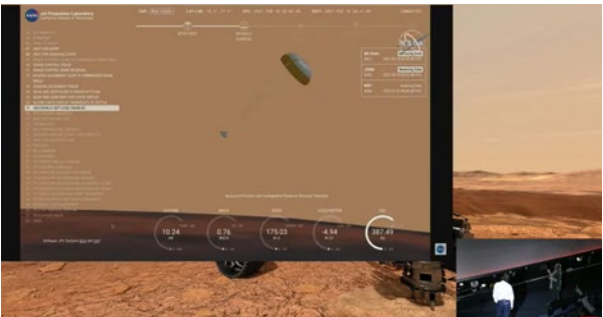
- Dr. Maciej Wielgus – the latest discoveries from the Event Horizon Telescope
- Prof. Aleksander Wolszczan – exoplanets and our current understanding
- Dr. Maciej Bilicki – the most surprising discoveries in space
- Leszek Orzechowski – designing the first Mars colony
- Dr. Aleksandra Hamanowicz – interstellar matter
- Dr. Radosław Poleski – looking for exoplanets
- Dr. Mariusz Gromadzki – supernovas, supermassive black holes and gravitational waves.
- Dr. Ryszard Gabryszewski – space rocks, formation of the Solar System



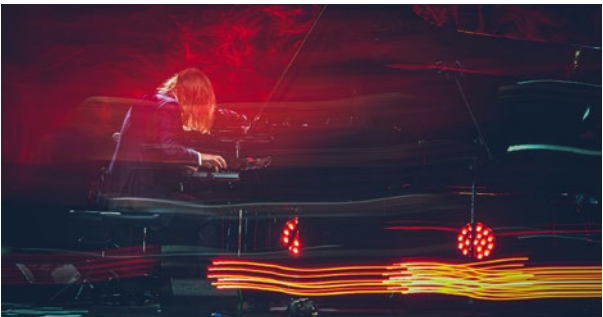
When our visitors find themselves among the stars and their eyes get used to the dark, we can hear gasps from throughout the auditorium. Outer space is truly captivating.



On the occasion of Polish Science Day, a lecture was given in the Planetarium by Professor Aleksander Wolszczan, the discoverer of the first known exoplanets. The prestigious astronomical journal Astronomy ranked Wolszczan on the list of the 25 greatest discoverers of all time: in the company of Isaac Newton, Galileo and... Nicolaus Copernicus, who had his birthday on the day of the lecture.



We watched the landing of the Perseverance Mars rover at the planetarium and online. Our virtual guest was Dr. Artur Chmielewski, engineer from the NASA Propulsion Systems Laboratory.



The pianist Leszek Możdżer performed at the planetarium as part of our celebrations of the centenary of Stanisław Lem's birth. The repertoire explored the author's writings. We heard tracks from Możdżer's acclaimed albums "Chopin Impressions" and "Piano". The concert was streamed online. The event was co-financed by the Ministry of Culture, National Heritage and Sport. Organizers: National Cultural Centre and the Copernicus Science Centre.



In early September the Planetarium closed for a few days to conduct technological upgrades and minor renovations. Following calibrations of our monitor systems, our guests are able to see even higher quality projections. We have also replaced the seats with more comfortable models.



Visiting safely

Just like in all public spaces, visitors to Copernicus are obliged to wear facemasks. Sadly, the requirement is frequently ignored, and we are forced to remind our guests to cover their mouths and noses. It's a major challenge, but also an opportunity to educate.

We explain and demonstrate how masks work and how they protect us. We have also applied some unusual methods: we have invited a mime to interact with people who aren't wearing masks. We were inspired by Antanas Mockus, former Mayor of Bogota and former Rector of the National University of Colombia. During his time in office, he recruited mimes to mock traffic violators at some of Bogota's busiest road junctions. The campaign resulted in reduced numbers of collisions and injuries.

The unusual method also worked at Copernicus. Although there were exceptions – some rude comments, visitors devising makeshift masks from unsuitable materials and even a few police interventions due to aggression – in the majority of cases calm discussion, demonstrations, experiments and masterful miming were highly effective. Our idea spread, and mimes also appeared in some shopping centres in Warsaw.



Knowledge first! We explain and demonstrate how masks work when worn correctly.



A mime in the exhibition space. It's hard to get cross when she asks you to wear a mask!



During the summer holidays, Copernicus served as a weekend point for vaccinations on the initiative of the Mayor's Office. The walk-in centre was busy with visitors happy to queue!

*To maintain the availability of exhibitions, planetarium and laboratories by flexibly shaping what we offer.*

**Audience development plan**

Achieving an almost double the forecast attendance levels confirms that Copernicus is as relevant as ever, and the public see visiting us as attractive and worthwhile. We know that we are an important point on Warsaw’s tourist map. We have a group of regular guests who are drawn by specific events and themes. Our visitors are of utmost importance to us, so we want to understand their needs as well as possible. By engaging in conversation, building relationships and working together we can create a tailor-made programme. There are also certain groups who never visit Copernicus, and we are striving to reach out to them. We have developed an “Audience Development Plan” which will allow us to discover our visitors’ needs, strengthen relationships and reach pre-pandemic levels again in 2023.

**Key directions in the “Audience Development Plan” 2021**

**Increase attendance levels from visitors from Warsaw and surrounds.**

**The pandemic has driven down the number of organised groups from outside the Mazovia region. The local market is limited, so we are encouraging guests to make repeat visits.**

- We have been promoting our latest offers (new exhibits, shows at the planetarium, the exhibition “The Future is Today”);
- We have been encouraging individual visitors to come again.

**Improving attendance among teenagers and young adults (school trips and individual visitors)**

**We have launched a campaign aiming to attract this group:**

- “The Future is Now” exhibition;
- an educational programme exploring issues from the “Future is Today” exhibition;
- shows at the planetarium: “Climate – A Hot Topic”, “Chaos and Harmony”, “ABBA Under the Stars”.

**Attracting children and parents and primary school trips:**

- “Climate – A Hot Topic” show at the planetarium
- “Bicycles on the Patio” accompanying the exhibition “Bicycles”

**Responding to ongoing requirements**

- We noted that interest in the exhibitions at weekends was exceeding the limits on visitor numbers imposed due to the pandemic. Visitors who were unable to book tickets may have gotten the impression that entry would be impossible and decide not to come at all. We identified times when attendance was low, and encouraged guest to visit us at those times. We invited local kindergartens, primary schools and parents with young children to visit us on weekday mornings, and focused on teenagers, young adults, students and seniors in the afternoons. We also encouraged companies to hold team-building events.
- Since we know that young people spend Friday nights going out, we extended our opening hours on Fridays. The weekend starts at Copernicus!
- Attendance numbers revealed that our exhibitions are more popular than the planetarium. To encourage guests to visit the planetarium, we introduced tickets combining entry to both.

**Visitors with special needs**

It’s extremely important to us that everyone can visit Copernicus in comfort and make the most of everything we have on offer. We have prepared a **Plan of Action for Improving Accessibility to the Copernicus Science Centre**, and we are eliminating barriers which have been making it difficult or impossible for visitors with special needs to fully enjoy their visit. We are working with foundations supporting people with disabilities including the Synapsis Foundation, the JiM Foundation and the Culture Without Barriers Foundation.



We are a partner of the STOP BARRIERS campaign aiming to improve accessibility to people with disabilities.

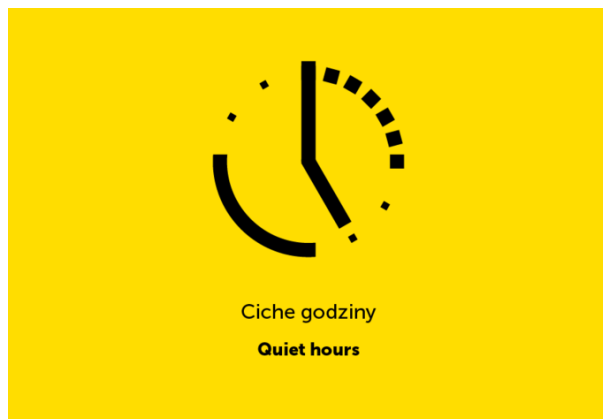


#### What we achieved in 2021:

- Together with the Synapsis Foundation we have developed a guide for visitors on the autism spectrum to help them prepare for their visit.
- We have launched quiet hours for people with sensory sensitivities and those on the autism spectrum. Every first Wednesday of the month, between 1pm and 6pm we switch off any loud exhibits, separate out the zone of stroboscopic exhibits and refrain from making any announcements over the loudspeakers. We held three quiet Wednesdays in 2021. We have heard from various foundations working with people with disabilities that this campaign has been warmly received. Quiet days are also popular with visitors who simply find Copernicus too loud.
- We have launched pages with information for people with accessibility needs, including materials written in plain language and recordings in Polish Sign Language.
- We regularly publish transcriptions from video materials on our website and social media.



During our free Culture Without Barriers festival, we welcomed over 200 guests with accessibility needs.



Our "Quiet Wednesdays" are attracting visitors who simply prefer to explore Copernicus in relative silence, as well as individuals with accessibility needs.

## *To open new exhibits, exhibitions, and experiments in the Copernicus Science Centre building and its environs.*

### **"The Future is Now" Exhibition**

When we opened the parcel containing Robobobo, one of the exhibits at the new exhibition "The Future is Today", many of us felt rather eerie. That's the effect of the "uncanny valley" – a sense of discomfort, repulsion and fear experienced when we're faced with a robot which resembles a human too closely. Robobobo is a creepily lifelike model of a baby. It is also fitted with a mechanism imitating the motion of the body during breathing. We wanted to see how it could be used in research.

We invited 17 adult volunteers to visit us at Copernicus. They were told that they will see a robotic exhibit which may stir powerful emotions. They went into the room holding Robobobo one at a time where they could examine it closely, and they were free to leave whenever they wanted. How did they respond? "Oh wow!", "Scary how realistic it is", "That's unnerving", "I'm quite emotional". The majority (14) of volunteers reported feeling discomfort – a common experience of the uncanny valley phenomenon. Robobobo is now a part of the Copernicus exhibitions. Placed in an incubator among other exhibits and suckling on a dummy (pacifier), it seems to be less unnerving.

"The Future is Today" is an exhibition we will continue developing over the coming two years. The launch of the first instalment, "Digital Brain?", was the most important premiere of 2021 at Copernicus.

"The Future is Today: Digital Brain?" aims to help visitors to discover and understand challenges of the contemporary world, and to realise that we are shaping our own tomorrow and have an impact on how events unfold. It presents myriad technological solutions and encourages visitors to look at them critically. It also notes the relationships between our own personal views and those of other people. How does AI know what we're thinking? Can you make friends with a robot? Where do virtual artists find inspiration? We must all find our own answers to these questions.

**About the “Future is Today” exhibition**

The exhibition comprises three parts, the first of which was launched in November 2021. The following two will be unveiled in 2022 and 2023.

**1. Digital Brain?**

The first instalment encourages visitors to think about boundaries of trust, privacy, intimacy and safety, and to consider new definitions of art and creativity in the world built using state-of-the-art technologies.

**2. Mission: Earth (planned launch: September 2022)**

The second instalment will focus on imagining the future of life on our planet by exploring issues such as the progressing destruction of the environment, climate change, cities of the future and colonisation of space.

**3. Life 2.0 (planned launch: February 2023)**

The third instalment of the exhibition will explore the future of medicine, designer humans and cyborgisation. We want to inspire visitors to reflect on the boundaries about healthcare and wellbeing, when technology could tempt people to improve themselves.

**Educational programme**

The “Future is Today” exhibition is accompanied by an educational programme of the same name. During meetings with teachers and students, we will develop lesson formats and scenarios to be used during the visit at Copernicus and back at school. The materials are also uploaded to the National Educational Network platform. More about the programme in the section “To mobilize people around important science-related topics”.

The exhibition forms a part of the project “Educational and information campaigns for disseminating benefits of digital technologies” implemented by the Chancellery of the Prime Minister with the NASK National Research Institute and the Copernicus Science Centre. The campaign aims to promote the use of technologies in all aspects of everyday life by people of all ages by breaking barriers and improving digital competencies of the society as a whole. The project covers five topics: wellbeing, e-services, on-line safety, programming and digital future.

**“Climate: A Hot Topic”**

When we were updating the repertoire of the planetarium, we asked teachers to suggest topics. Climate change issues emerged as a clear favourite, with students increasingly asking about them during lessons.

The topic of climate change has been stirring powerful emotions and feeding political discussions for many years. It is widely discussed at schools, and voices of concerned young people resound out in the streets.

We took up the challenge. Following consultation with climatologists including Prof. Szymon Malinowski we developed a presentation which discusses the changes in a

responsible, scientific and hopeful manner. Between October and the end of 2021 it was watched by over 6000 people. Although it was devised with teenagers in mind, it also attracts younger and older viewers. It is popular with individuals and families visiting the planetarium at weekends..



The presentation “Climate: A Hot Topic” was made for teenagers. It is highly popular with adults and whole families.

**Workshops, labs, experiments**

During the summer workshops “Family Tinkering with Copernicus”, a small boy made a rocket from a balloon and bits of paper. The rocket didn’t fly very well, so the parents wanted to help. They worked together to build four more models, looked for reasons and tested the latest ideas. As the family of ad-hoc engineers were leaving the workshops, they were discussing their plans to make another modified rocket at home.

This is exactly how we want our activities to work by stirring curiosity and serving as inspiration to ask questions and seek answers.

Our laboratories inspire, stir curiosity and encourage experimentation. We have been continuing the e-labs as part of the “Science for You” programme since January. We have also launched new online labs. In July and August, we opened research stations at the chemistry and physics labs adhering to strict sanitary requirements.

- 1772** participants in online labs
- 4288** individuals conducting experiments at our research stations
- 658** participants in summer family workshops





Development of the exhibition "The Future is Now: Digital Brain?"



These balls are neurons in a digital brain. Each one contains a unique set of dendrites. The exhibit explains how neural networks learn.



Can AI be creative in its own right, or is it simply a tool for artists? The cubist mirror is undoubtedly still the latter.



Of all cultural institutions in Poland, only Copernicus is taking such a broad look at the challenges of the future. We explore biotechnology, digital technologies and artificial intelligence.



Our robotic baby doesn't make everyone experience the uncanny valley effect – it makes some people feel emotional.



# To provide local communities with exhibitions and activities

## SOWA initiative

The name SOWA comes from a Polish acronym for “Zones of Discovery, Imagination and Activity”. The SOWA initiative aims to create a nationwide networks of local science centres by applying state-of-the-art educational and exhibition solutions. They will be created all over the country at existing cultural, scientific and educational institutions (e.g. cultural centres, libraries, museums) whose statutory or programme activities include popularising science, technology, education, art and culture.

The aim of the initiative is to encourage social engagement with science and its understanding, to demonstrate that rather than being a set of facts, science is a way of acquiring knowledge and learning more about the world, and to develop creativity and a sense of agency.

The SOWA project is an initiative of the Ministry of Science and Education. It forms part of the Ministry Social Responsibility of Science programme, aiming to popularise and disseminate science and research.

SOWA centres will be created in towns and cities with a population of up to 150,000 people. Their activities should expand the learning environment and enhance the resources shaping students’ scientific capital.

Each SOWA centre will include an exhibition comprising 15 or 18 exhibits allowing students to conduct experiments and a workshop providing a space for logical, construction and engineering challenges to be solved by individuals or groups. They will also be supplied with scenarios of classes previously held at Copernicus.

The location of the first two pilot sites were selected by the Minister in 2020. They were opened in 2021 in the towns of Piotrków Trybunalski and Racibórz.

The recruitment process for SOWA was launched in April 2021. Candidate institutions must meet certain criteria and present an outline of how they see the future centre will operate. Another condition was for a collaboration agreement to be signed between the institution and their local government unit. A joint committee of the Ministry of Science and Education and the Copernicus Science Centre assessed the applications, analysed the local conditions and accessibility and considered each institution’s experience and ideas of functioning and development. Following the committee’s recommendation, the Ministry the selected the locations of the next 30 SOWA institutions. The recruitment process closed in September 2021. The results were announced during the opening of the first pilot SOWA centre in Piotrków Trybunalski on 20 September 2021. The following SOWAs will be opened in 2022 and 2023.

## SOWA locations





But exhibits, workshops and class scenarios aren't all that Copernicus brings to SOWA. We welcome the centres to join the Young Explorers' Club network and take part in ESERO challenges and competitions (more in the "Supporting the development of competences of the future" chapter) and other programme activities.

In 2021 we visited 24 institutions which will host SOWA centres in 2022. We got to know one another, had a look around each location, talked about our future collaboration. We travelled a total of 17,284 km! We will return to each site with exhibits which we will install, and to hold training sessions for employees.

Our first visits to the future SOWA centres helped us discover their potential. In Wałbrzych, the centre will be held in a historic coalmine, while Koniecpol and Zawiercie will be opening up disused railway stations. In Jarocin, a SOWA centre will be created in the Radoliński Palace, and in Nysa in a former Prussian bunker. Such locations are real treasure-troves of inspiration for devising workshops and lesson plans. We encourage institutions to draw upon these opportunities when planning future activities.

It is important to us for the SOWA centres to work together and remain in touch without our involvement. It is important to build relationships, share experiences and work together on joint projects. In 2021, the opening of the SOWA centre in Piotrków Trybunalski was attended by representatives of most of the future sites. The original centre is harnessing its experience to support new SOWAs.

In December 2021, Copernicus hosted the two-day-long SOWA FORUM with 97 participants. It was the perfect opportunity for our guests to visit our workshop and exhibitions. We held workshops introducing the YEC and ESERO programmes. We worked together to find solutions.

One of the staff members at SOWA in Piotrków Trybunalski admitted that he hasn't been able to solve a maths puzzle which is an exhibit at his centre. He explained how his continuing attempt led to frustration, discouragement and anger, but he persevered to seek the solution without help. We are truly impressed, because he clearly scores top marks for patience and determination! We are sure he will find the solution eventually. His experience also changed the approach of his colleagues. In the early days they were really keen to engage visitors to their exhibitions by immediately offering help, explanations and demonstrations. This experience helped them realise that allowing guests to find answers for themselves is at least as worthwhile!

The SOWA initiative is subsidised by the Ministry of Science and Education under agreement No. 1/CNK-SOWA/2021 signed on 2 March 2021 on the Copernicus Science Centre's launching of 32 local SOWA centres (SOWA 2021–2025).



In September, the first SOWA centre was opened in Piotrków Trybunalski with a ribbon-cutting ceremony. The centre welcomed 2754 visitors by the end of the year.



The second SOWA centre in Racibórz opened on 20 December. It received 128 visitors before the end of the year.

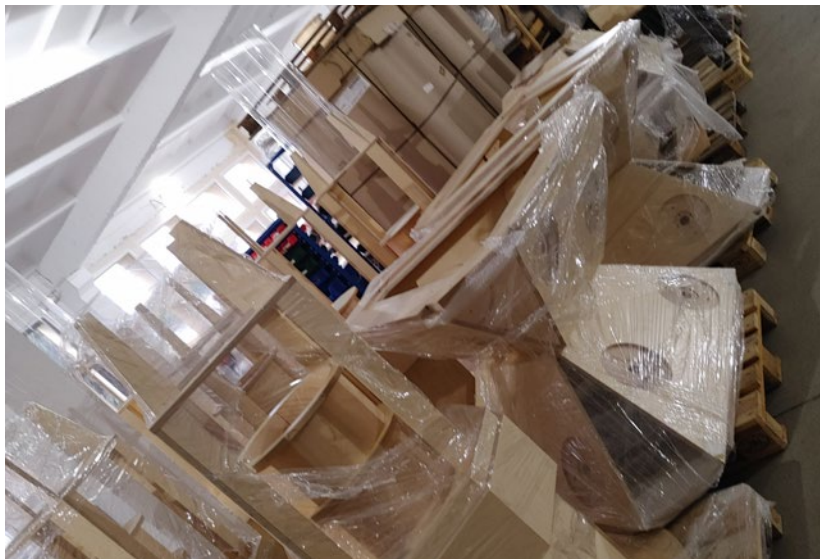


The exhibits and challenges at the workshop aim to stir curiosity and inspire visitors to continue exploring and learning. What questions will young people ask themselves at the exhibition? What will they want to test? It's entirely up to them!





Each SOWA centre will have 15–18 interactive exhibits for self-experimentation plus a tinkering space for construction work.



The exhibits have been prepared by designers at Copernicus. Our team is making them for all 32 of the SOWA centres. We ran out of room at the Copernicus workshop, so we have had to lease some factory space!



As well as the exhibits, we also provide the know-how. As we have gotten to know the local staff, we find ourselves delighted to work with such highly dedicated individuals.

## “Science for You” Programme

Science for You is a project prepared jointly by the Minister of Science and Education and the Copernicus Science Centre. Its aim is to encourage students to take an interest in science by conducting experiments. The programme also supports teachers in using the scientific method and ways of engaging students during lessons. The roving “Educobus” carrying interactive exhibitions and “Planetobus” with its mobile planetariums reach locations in Poland which have poor access to science centres. When they were kept parked during the pandemic, Science for You managed to move online.



The Educobus carries exhibits for individual experimentation and discovering the laws of nature. The Planetobus is a mobile planetarium with presentations about astronomy. In the evenings, visitors can reach for telescopes and binoculars to observe the stars for themselves.

### In-person and online visits

In 2021, the Educobus took 24 trips, travelling a total 12,872 km. The pandemic kept the Planetobus in the garage.

We held 198 classes online: 57 e-Educobus, 79 e-Planetobus and 62 e-Laboratory lessons.

We reached a total of 15,213 individuals in 215 towns.

Our workshops welcomed 214 teachers

### Vaccination

In 2021, we added the “Immunity” scenario to lesson plans used by the e-Educobus and e-Laboratories. Students conducted experiments to find out ways of spreading microbes (washing hands with water alone was not enough!) and discovered the process of producing vaccines.

The experiments were followed by discussions. The participants shared their views and thoughts about the pandemic and vaccination, and compared them with the latest scientific knowledge.

Educobus and Planetobus visits are important events for local communities. Local officials frequently come for a visit, and we are featured in local media. Students conduct



experiments during school hours, and in late afternoons when the exhibitions are open to all visitors they often come back with their entire families, frequently embracing several generations. When we moved our activities online, we lost contact with these extra-curricular communities, which led us to developing the family educational kits “Science for You at Home”. The kits, containing ingredients, instructions and educational tips for conducting experiments at home, were distributed to 50 families as part of the pilot programme. By using the kits and widely-available ingredients, kids and parents created rainbows in tumblers, made hydrogels and built towers out of pasta. More on the kit in the section on “Supporting the development of competences of the future”.

**“Science for You, or what you should know about learning” podcasts**

We prepared 13 short podcasts for teachers as students featuring discussions about the learning process with Prof. Wojciech Pisula, psychologist at the Institute of Psychology, Polish Academy of Sciences.

The podcasts are published on streaming platforms and our website and YouTube channel. They were heard by around 130,000 people in 2021.

Episode titles:

- What does it mean that someone is learning?
- What role does experimentation play in learning?
- The role of peers in the learning process
- Can teachers be replaced by robots?
- Do we need learning aids?
- What is learning through play?
- The carrot and the stick – best motivation techniques
- What’s better: learning systematically or cramming?
- Sitting down? Lying down? What’s the best position for learning?
- What are digital technologies doing to our minds?
- Do people learn differently or in the same way?
- Take off the headphones! Does music help us learn?
- Do we need breaks while we’re learning?

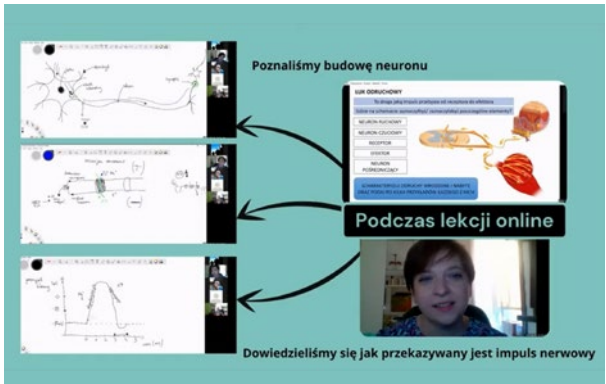
The joint programme of the Ministry of Science and Education and the Copernicus Science Centre “Science for You” is financed by the Ministry of Science and Education under agreement No. 1/CNK-Nr 1/ CNK-NAUKOBUS/2020 signed on 6 March 2020. The “Science for You” programme includes the Educobus and Planetobus activities and online classes..



The exhibits which travel on the roving Educobus are reminiscent of those at Copernicus. Visitors conduct experiments and observations to learn about certain phenomena.



Moving engaging lessons into the virtual worlds was a major challenge! We devised new formats: e-Laboratories, e-Educobus and e-Planetobus. According to teachers, we managed to hold their students’ attention and encouraged them to experiment in front of the screen.



The “Science for You” competition: teachers and students developed aids to assist learning by using the scientific method. They presented their achievements in videos.



In 2021, we held two Summer Prototyping Schools – week-long workshops on developing teaching aids. The first session for teachers participating in the “Science for You” competition was held online.



The second Summer Prototyping School of 2021 was held in person in Góra Kalwaria, bringing together individuals interested in developing teaching aids and learning using the scientific method.



On 14 October, the Copernicus Science Centre hosted the gala finale of the “Science for You” competition. Winners received financial prizes (for teachers and schools) and awards (for students). The awards were presented by Przemysław Czarnek, Minister of Science and Education, and Robert Firmhofer, CEO of the Copernicus Science Centre.

# To support the development of competencies for the future

*To develop a networked learning community.*

### The International Young Explorers’ Club (YEC) programme

The story of the YEC in the town of Augustów started several years ago, with a dad conducting simple experiments for his kids in the kitchen. When one of his daughters talked about it at school, her teacher invited the dad to come work with students at the school. That’s when the dad first saw a newspaper article about Young Explorers’ Clubs. He joined workshops on how to start a club, and now he leads two groups at the Municipal Public Library in Augustów. Every Saturday, kids gather among a backdrop of books to conduct experiments and learn about the world around them. The library provides all the necessary materials, and the librarians enjoy the noise and chaos. They have also noted that they are lending more books, including popular-science volumes. In 2021, the Augustów club was one of the winners of the YEC Masters competition.

#### About YEC

YEC clubs can be created anywhere – in a big city, a town, in a rural village. They don’t require extensive infrastructure. All that’s needed is an enthusiastic leader, some simple equipment and a bit of space. You won’t have to look far for curious children. During meetings, kids conduct experiments under the guidance of club leaders to learn new things and hone their communication skills, logical thinking, creativity and teamwork.

The greatest challenge faced by YEC in 2021 was remaining in touch and working with members of the programme in spite of the ongoing pandemic. Many clubs suspended their activity or withdrew from additional projects. Some club leaders held online sessions and conducted experiments on-screen. Science picnics also moved online.

Copernicus and our partners in Poland and abroad worked hard to support the leaders in their online meetings. We organised webinars, conferences, regional forums and an international forum. The latter was held online. YEC partners and leaders from Poland, Ukraine, Georgia and Armenia worked together to develop the programme and host workshops and discussions. The meetings were translated into the languages of all the YEC member countries. One of the aims of this year’s forum was to streamline the ideas and goals of the programme.

#### YEC goals

- To help club members hone their learning skills
- To help club members learn to conduct experiments using research tools
- To help club members improve their skills in teamworking and sharing knowledge, skills and experience
- To build enduring communities of children, young people, leaders and club partners
- To provide opportunities for club members to meet researchers and popularisers of science.

### Young Explorers’ Clubs 2021

At the end of 2021, there were 873 registered clubs in Poland. There are around 200 clubs in Georgia and Ukraine. Armenia has also joined the programme, with 20 clubs.

### Partnerzy regionalni KMO

Regional YEC partners are institutions and organisations supporting and developing club activities in the region. This enables club members and leaders to take part in events, workshops, conferences and meetings without having to travel (to Copernicus, for example). Partner institutions also support local clubs in exchanging information and experiences, and drive the development of the network in the region.

In 2021 regional partners hosted **YEC Experts** webinars supporting the development of club leaders’ skills. They dealt with the latest developments in pedagogy, learning methods and creative use of educational tools. The nine meetings were attended by around 400 club leaders, programme partners and experts in many scientific fields.



Regional partners also work with us, and we share our experience and identify local needs. In 2021 we held six meetings with the participation of around 100 individuals representing institutions from Poland, Ukraine, Georgia and Armenia (current partners listed in the table below). We discussed creating and developing local YEC networks. We also launched affiliations of regional partners in Poland in small working teams. Their aims are to popularise YEC in kindergartens (Chełm/Kalisz) and develop research projects (Mazowsze, Warmia and Silesia). In 2021, we held the first ever grant competition **YEC Regions**, aiming to support regional partners in promoting the YEC programme, recruit new leaders and support existing ones. Grants were awarded to four partner institutions, whose their activities (such as regional forums, conferences, online meetings and research projects) involved around 1500 individuals.



The urge to learn and the natural desire to discover the world are the driving forces of the Young Explorer's Clubs. Club members ask many fascinating questions. They look for answers by making observations, performing experiments, and drawing conclusions.

### YEC in Mazovia

As the regional partner of the YEC network in the Mazovia region, in 2021 we at Copernicus invited our clubs to take part in workshops and meetings held as part of our programme activity (the Future is Today exhibition, the Lay Out – Let Out conference, ESERO and the Science for You programme). Novice club leaders took part in workshops “YEX for Beginners”. We prepared the project **YEC Researchers** for club members, combining independent experimentation with online activities. Several leaders and around 100 kids from 12 clubs studied the impact of external factors on the life cycles, proliferation and behaviour of daphnia. Taking part in the project bolstered the motivation for continuing the clubs during the pandemic and helped build relationships. It also contributed to the reactivation of clubs which had suspended their activities. We shared our experiences at the Lay Out – Let Out conference, in a brochure on the scientific method (as part of the Science for You programme) and a booklet on methodology for club leaders. We will continue to develop the format of YEC Researchers in the coming years.

We are delighted with the club activities. The online picnic, organised by the municipal kindergarten in Legionowo, was attended by clubs from all over Poland and abroad. We want to support similar grassroots initiatives further afield through the competition YEC Masters. Its participants present their most successful projects and share good-practice tips. In 2022 the competition will spread to Georgia and Ukraine.

### YEC abroad

In 2021, we teamed up with the “School with Class” Foundation to reach out to partners in Georgia, Armenia and Ukraine. New clubs founded in Georgia have taken part in the international YEC Forum, online meetings and webinars and developed lesson and film plans. Georgian club leaders held workshops for teachers in Armenia, leading to the foundation of 16 new clubs.

During the second year of YEC presence in Ukraine, partners from Lviv and Ternopil held online workshops and meetings on working with the scientific method for around 30 club leaders. The number of clubs is growing gradually. The Ukrainian YEC community was highly active during the forum and its representatives appeared in a film on animating visitors who attend science picnics.

Armenia is now home to around 20 clubs. Their leaders share their experiences on a Facebook group and hold regular online meetings. The club leaders who are also teachers harness their YEC experience during regular lessons as well.

#### Partners of the Young Explorers' Clubs

##### Strategic partner

Polish-American Freedom Foundation

##### National partners

Polish Children's Foundation • Children's University Foundation • German-Polish Youth Office • Good Education Foundation

##### Regional partners

ExploRes Association, Rzeszów • Youth Astronomical Observatory, Niepotomice • Teacher Training Centre, Olsztyn • Łódź Children's University at the Łódź University of Technology • Vocational High School, Chełm • Technical and Vocational School Complex and Centre for Continuing Education, Leszno • Wrocław University of Technology • University of Białystok • Silesian Centre for Education and Interdisciplinary Research in Chorzów • Centre for Craft Support, Dual and Vocational Training in Kalisz • WSB University in Gdańsk • Kazimierz Wielki University in Bydgoszcz

##### Foreign development partner

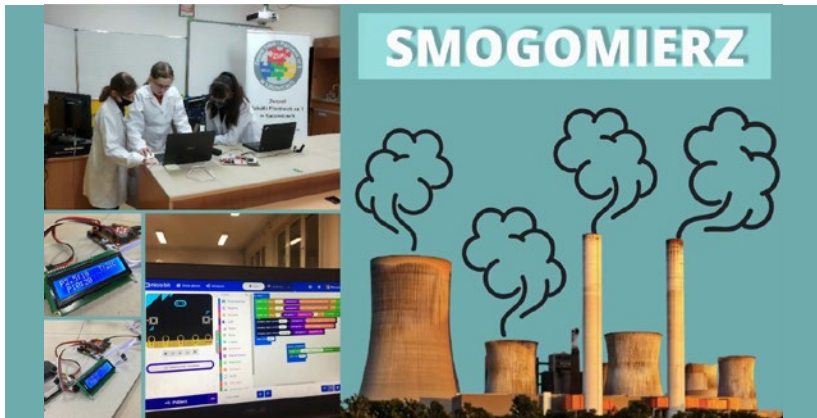
School with Class Foundation

##### Foreign partners

Ilia State University, Tbilisi, Georgia • Mekelle University, Mekelle, Ethiopia • L'viv Dovzhenko Centre, Ukraine • Science Centre in Ternopil, Ukraine • Byurakan Observatory, Armenia • Jinishian Memorial Foundation, Armenia



Members of the Clubs construe their own knowledge and develop competencies for the future – skills at complex problem solving, critical thinking, communication and cooperation, as well as digital competencies.



YEC members are always present at the Science Picnic. In 2021 they sent us films about smog, the effects of air pollution on weather and showed us how to build an educational greenhouse and conduct experiments on CO<sup>2</sup>.



Each club is a micro-community. Club members and leaders conduct experiments together using simple, cheap and readily available materials.



YEC members and leaders take part in events organised by Copernicus such as the Science Picnic, the Science for You programme, Dream Designers and ESERO programmes and the Lay Out – Let Out conference.

## Lay Out – Let Out Conference

Where does knowledge come from before it makes its way into books? During the Lay Out – Let Out Conference we discussed the process of attaining knowledge. We hosted teachers, researchers, educators and students. Around half of them were first-time visitors! We hope they will stay with us for longer.

We frequently leave school thinking that textbooks and Wikipedia can answer all our questions; that knowledge is a “ready product” which we simply need to reach for. The process of attaining knowledge is unsettling, because it is inevitably accompanied by errors and blind alleys. We have all witnessed this process of scientific exploration during the pandemic. But this is how we gain knowledge – through research, testing, analysis and discussion.

During the conference we considered how to bring education closer to science. Copernicus has plenty of experience in the area: we have been endorsing the notion of using elements of the scientific method in teaching for many years now, since we believe it helps students gain a true understanding of science. Formulating problems, conducting studies and analysing and verifying results are the most reliable ways of gaining information. Direct interaction between students and scientists is also invaluable. Such contact make science seem more real and less inaccessible. We encourage teachers to invite experts to schools (for example as part of ESERO’s “Lessons out of this world” programme), join projects such as YEC Researchers, take part in events with the participation of researchers (for example ESERO’s “Galaxy of women”) and develop relationships with local schools and universities.

In 2021 the conference brought together around 120 people. Half are participants of our existing projects: YEC (around 50), ESERO (22), Science for You (17), Summer Prototyping School, Dream Designers (15) and the Learning Adventures conference. The other half joined us for the first time.

## ESERO Programme

ESERO is the educational programme of the European Space Agency (ESA) aimed at teachers and students at all levels of education. We support teachers of STEM subjects and help them frame them in the context of space research. We aim to inspire young people to consider careers in engineering and technology



**ESERO in 2021**

- 29,065 participants in the ESERO programme
- 416 participants in the online course encouraging the use of satellite images during lessons
- 30 participants in the Summer Space Education School for educators working with young people vulnerable to exclusion
- 29 space-themed educational kits loaned to community centres throughout Poland
- 28 educational materials introducing space research during school lessons
- 78 workshops organised by Space Ambassadors
- 632 young people constructing minisatellites as part of the CANSAT competition
- 14 “Space Over Coffee” meetings where we discussed space education with educators
- 44 “Lessons Out of this World” during which experts explained their space-sector jobs to students
- Two meetings held as part of the “Galaxy of Women” programme with the participation of six experts who discussed their work in the space sector. The meetings had been viewed by 2,500 people on YouTube and almost 8,000 people on Facebook by 15 December.

**What we learned in 2021**

We noted that many projects held as part of the ESERO programme attracted the same group of participants. It’s certainly possible that some teachers and students consider the competition to be too challenging. We want to break this barrier by reaching out to schools in smaller towns, and by having less focus on technology.

We launched a cycle of meetings “Space Over Coffee” where we introduced ideas of the ESERO team to educators, teachers, YEC leaders and popularisers of space science. We also invited experts and participants in previous editions of our competitions and challenges. The fact that the meetings were held online was a bonus, since they were open to all participants, no matter where they were based. We discovered that individuals who are engaged in the process of developing projects are then more likely to take part in them with their students. For the “Climate Detective” challenge, it turned out that many teachers did not understand the rules and did not feel confident about taking part. We will make sure in the future to talk and write about the project with more clarity.

Participation in the CANSAT competition does require a certain level of design, programming and technical skills. However, we also wanted to encourage individuals with less experience to take part, as well as those from disadvantaged communities and without sufficient resources to develop their passion and skills. This is why, before starting the competition, we held workshops on constructing minisatellites. As a result, more new schools submitted entries, and previous entrants prepared improved projects and progressed further. This year’s participants include representatives of smaller towns and high-school students.

We launched the Summer Space Education School and invited 30 educators teaching children and young people vulnerable to social exclusion. The participants learned

about ESERO and how to prepare their students for our competitions. The effects were almost immediate, and last year’s CANSAT competition saw the first entries from students of teachers participating in the programme.

We worked hard to bring science and education closer together. We started working with scientists working in the space sector, including Dr. Agata Kołodziejczyk (neurobiologist running an analogue mission centre), Dr. Jakub Bochiński (leader of space projects), Dr. Joanna Kozakiewicz (astronomer) and Jakub Stelmachowski (Polish Space Agency).

We worked together on preparing scripts for “Lessons under the Stars” which they delivered at schools. Thus we introduced space science to formal education. The interest in the project was huge: we received 800 applications, even though we prepared just 20 lessons. Teachers who were unable to host the scientists received a pack of film materials and lesson plans. We also held a webinar where students could meet our experts.

The project “Galaxy of Women” involves meetings with scientists working in the space sector. The project is aimed at girls interested in choosing a similar career. We introduce them to potential jobs in the sector and show them that the stereotype that space is the domain of men is simply not true. Attendance at all meetings was lower than we’d hoped, so in 2021 we modified the existing formula. To make it more appealing, we asked our guests to give interesting and inspirational details of their own lives and work. One of the experts, a space archaeologist, said that “working at excavation sites means there’s a danger of being swept up by a tornado, getting lost in a desert or getting attacked by wild animals”. We used the quote in our invitation to the meeting, and the attendance increased noticeably. 80% of the participants of the last “Galaxy of Women” meeting of 2021 were school students, with the remaining 20% being teachers and fans of space. We also changed the format from mini-lectures to moderated discussions. We saw a greatly increased chat activity, discussions and topical questions. After the meeting we were bombarded with questions on Facebook and Messenger asking how to get involved with the space sector.

One of the participants in “Galaxy of Women” discovered the existence of CubeSats and met Natalia Lemarquis from the Space4Women programme. The girl decided that during her four years at high school she would build a CubeSat and launch it into space. Natalia became her mentor. The project was highly praised by the Space Research Centre and attained a higher score than those of some university students.



The CANSAT competition is a flagship ESERO programme. In 2021 the OSATeam won the Polish edition of the competition and was named Best CANSAT in the European finals.

**Projects as part of EU’s Erasmus+ programme**

Taking part in international educational projects is a perfect opportunity for us to share our experiences and take a fresh look at our activities. It’s also an opportunity to find inspiration and new partners.

During **“Tinkering for Adults”** we improved our skills at running workshops for adults with special educational needs. In 2021 we developed and tested two workshop scenarios: making cardboard furniture and creating a home garden. The tests were attended by 25 people. During an online meeting with other project partners, we realised that the scenarios could be further improved: that the participants would find it easier if they could see final versions of the designs made by others. We are planning on running workshops for 60 people during the first half of 2022. The aim of the project is to help adults develop competencies for the 21st century, build confidence, encourage continuing development and drive interest in science and technology.

The project is implemented together with NEMO Science Centre in the Netherlands (project leader), MUST in Italy, University of Cambridge in the UK, Science Centre Network in Austria and TRACES in France.

We want to provide practical, in-person and online activities for technical and vocational schools. We prototype kits and materials and test them with students and teachers as part of the **Hands on Remote** programme. We have already designed several

experiments. To conduct them, the students need to build something, sometimes build a device for taking measurements and conduct experiments. During the first lesson they build a simple object, conduct experiments and are given homework (e.g. to build a car driven by a rubber band). At the next lesson they present their results and conduct measurements (e.g. by placing a phone in the car to measure its acceleration). They analyse data at home and complete further tasks. The final lesson includes a summary of all results and conclusions. How are kits working out? Tests are ongoing and we are awaiting results.

The project is implemented in conjunction with the Deutsches Museum in Germany and Universidade in Portugal.

**RETHINK project**

The RETHINK project was developed to examine and improve existing methods of science communication. In 2019 project partners examined online science communication in their countries, looking for similarities and differences. The outbreak of the pandemic in 2020 turned out to be a natural topic to study. We decided to find out how people approach the issue of wearing facemasks and how they drew their conclusions about whether they work or not. What guides their thinking? In 2020 and 2021 we developed tools to help science communicators. The methodology was developed by UWE Bristol in the UK and Vrije Universiteit Amsterdam in the Netherlands. At Copernicus we prepared and tested scenarios for workshops for 15 people working in science communication.

Project partners are Sissa Medialab (Italy), Athena Institute at the Faculty of Science at Vrije Universiteit Amsterdam (the Netherlands), Instituto de Tecnologia Química e Biológica António Xavier – ITQB NOVA (Portugal), the Center for the Promotion of Science (Serbia), V&A (Sweden) and UWE Bristol – University of the West of England (UK).

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 824573.

**“Good Practice: Construction Workshops” guide**

During the first quarter of 2022 we will publish a guide for anyone hoping to hold construction workshops for kids. Where should you start? What should you do? The booklet will include answers to these and more complex questions. We will share our extensive experience with “maker culture” gained over many years of organising and hosting workshops. The guide will be distributed online.

It was created together with our partner Raytheon.





Kites, darts, and a solar-powered oven. On summer weekends, whole families built things together with us at our workshops. The activities were part of the Children's University initiative in Warsaw's central Śródmieście district.



Together with members of our consortium we prepared a multimedia app for schools to help students learn about physics using the scientific method.



Sometimes exhibits inspire us to pursue unplanned directions. Thanks to RoboBoby, we decided to study the "uncanny valley" effect.

*To encourage exploratory behaviours in visitors and people participating in other activities.*

## R&D efforts in 2021

Innovation is the result of research and creative ideas. At the Copernican Revolution Lab we work in interdisciplinary teams, making use of research methods that have been developed at Copernicus since our foundation over a decade ago.

We examine the effectiveness of our own projects and programmes. We organize testing of educational products, and try to find out what motivates learners – after all, motivation is key to success.

## R&D at the Copernican Revolution Lab

### Preparing engaging online events

When the pandemic forced us to close Copernicus to visitors in 2020, we moved all our activities online. We launched virtual workshops, demonstrations and guided tours for students, parents and teachers. It is important to us for our online activities to encourage our audience to act, ask questions, get involved in discussions and – most of all – to continue experimenting, even if it's in front of the screen. We wanted our activities to include experiments our viewers can conduct by themselves, at home, without complicated equipment and materials.

In 2021, we made an evaluation of our ongoing online activities and categorised them by how engaging the audience found them. Different types of online activities stimulate different kinds of engagement, including cognitive, emotional and behavioural. We learned that activities based on watching (e.g. virtual exhibition tours and concerts at the planetarium) stimulate emotion-based engagement such as delight and reflection. Meanwhile, experimenting and communicating with the audience (e.g. through online labs) stimulates behavioural and cognitive engagement. Experiments conducted at home engage the individuals on every level. We used this information to develop such activities, and we are continuing to develop our online methodology.

### Scientific practice for the "Science for You at Home" kit

In 2021, we developed an educational kit for families with kids as part of the Science for You programme. The kit includes instructions for conducting experiments, teaching materials for parents and some of the accessories required for the experiments. The remaining ingredients are widely available and found in most home kitchens. The

experiments include creating a rainbow in a glass, making a hydrogel and building a tower of pasta.

We piloted the programme by sending the “Science for You at Home” kits to 50 families. The main users – kids – usually worked with a parent, and less commonly alone or with friends or siblings. We conclude that working with the kits requires the presence of an adult or an older assistant. We noted three ways in which parents supported their kids: cognitive support (by asking questions and helping draw conclusions), emotional support (offering encouragement and motivation) and instruction (supervising the experiment and helping with more difficult tasks).

The majority of parents said that they largely let their kids conduct the experiments alone, only lending a hand when they were really stuck. We believe this is the best strategy for helping children develop agency and problem-solving skills.

**Scripts developed as part of the Make it Open project.**

The aim of the international project Make it Open is to build a learning environment in which schools become centres of collaboration for local institutions to help solve social problems (open schooling). One part of the project involves developing lesson plans.

Our research team takes part in developing ways of evaluating the plans. We have worked with students to test eight versions, two per country participating in the project and two developed at Copernicus.

In all countries the greatest challenges have been involved in putting teachers in touch with external partners and organising student groups for teamwork. We are preparing instruction materials to help initiate partnerships with experts, including templates, scripts for lessons with experts, good practice and advice.

We also discovered that the term “citizen science” is unclear for the majority of teachers. The team at the Bloomfield Science Museum in Jerusalem is working on a new, clear formulation of the project goals.

The teachers taking part in the study have declared that content of the project is valuable, and that they will continue using it after the completion of the project.

Make it Open comprises seven institutions: the Copernicus Science Centre (Poland), Bloomfield Science Museum Jerusalem (Israel), Stichting Waag Society (the Netherlands), Fixperts (the UK), EUN Partnership AISBL (Belgium), Teachers College Columbia University (the US) and ECSITE.

**Air Quality educational kit developed by our Modular Natural History Labs**

Our Modular Natural History Labs have developed the next educational kit, “Air Quality: Studying Particulate Pollution”. It serves as a supplement to the kit “Air”, but it also functions independently. The kit was developed for students aged 12–13, but it can be used equally successfully in high schools. The kit comprises tools and materials for students to conduct experiments and scripts and lesson plans for teachers.

We agreed with the teachers that the kit would be evaluated online. Any mistakes or missing information can be reported at any time, and proposed amendments will be discussed during regular meetings.

**Innovative educational tool “Multilab: Physics”**

“Multilab: Physics” is a multimedia app developed by Copernicus comprising a kit of engaging physics experiments for high schools. Classes using the kit start with the students watching a video where experts from Copernicus demonstrate a given phenomenon. Students formulate research questions and conduct experiments to find answers. The app also contains the list of required materials and instructions for running the experiment. The teachers have supplementary materials to moderate initial discussions and the summary at the end of the classes. We wanted to develop tools which could, to some extent, replace experiments in physics labs during virtual lessons.

One of the steps in developing the tools was a study of user experience. We invited physics teachers and students to take part. They looked for any technical errors which may appear while using the app. They noted that the layout of the text and images was counterintuitive and at times illegible. The video streaming element was too slow and didn’t allow users to scroll. Information on technical problems was reported to the development team, who remedied them.

The testers appreciated solutions which make our app stand out from similar ones available on the market. This included the function of students having individual profiles they can use rather than simply viewing the teacher’s presentation. The tab “Troubleshooting” where users can find out how to approach problems they might encounter during experiments was also rated highly.

The “Multilab: Physics” app is being developed alongside members of the Copernican Revolution Lab’s consortium: Moje Bambino and BeCreo.

**Mobile Toolbox, a workshop on wheels**

We have developed the Mobile Toolbox in collaboration with My Bambino company. It is a mini-workshop on wheels for elementary schools, equipped with simple tools such as tools for woodworking. Based on 10 construction tasks (printable instructions and videos), students can build by themselves for instance an astrolabe, a drawing pantograph, a sundial, a pendulum or a xylophone, that is their own teaching aids.

**Studies into how science is perceived**

**Working to change how primary school students perceive scientists and the work they do**

In 2018 we asked 489 primary school students (225 boys and 264 girls) to draw “a scientist at work”. In 2021, we analysed the resulting elicited drawings, looking for signs of stereotypes in how scientists are perceived.



So what does a stereotypical scientist look like? He's an older, absentminded man with dishevelled hair, dressed in a lab coat, pottering round a lab filled with test-tubes and flasks filled with bubbling, smoking liquids. It turns out that over half of drawings included at least of these elements: 67% of those drawn by boys and 48% drawn by girls. 47% of children drew a figure identifiable as male, while just 17% of children drew a scientist recognizable as a woman. We also found that the more stereotypical the depiction, the lower the given child's educational aspirations.

The results reveal that primary school students have a poor understanding of scientists and the work they do. We want to change this situation. We conducted pilot workshops with primary school students aged between 9 and 10 as part of the Erasmus+ programme. The students prepared and conducted interviews with scientists invited to their school. Preliminary observations of their reactions indicate that such a workshop model may have a positive effect on shaping their beliefs and attitudes towards science.

### **Studying the uncanny valley effect**

The "uncanny valley" effect is the eerie sense of unease felt by people interacting with robots which closely resemble humans. Our silicone Robobobo is an extremely life-like replica of a human baby shown at the "Future is Now" exhibition. We wanted to find out whether our visitors would experience the uncanny valley effect when interacting with it.

We had 19 volunteers taking part in our pilot study. Their task was to engage with the robotic exhibit. They could examine it closely, and they were free to leave whenever they wanted. Their reactions were recorded and examined by our researchers. The main emotion was unease, surprise and disquiet (14 individuals) corresponding to the uncanny valley phenomenon.

Copernicus has state-of-the-art robots, a terrific research team and numerous visitors we can ask to work with us. This provides perfect conditions for pioneering studies into the emotions and responses to realistic humanoid robots.

### **Studying perceptions of the scientific consensus and the impact of information on how science is perceived**

The public space has been overwhelmed with a deluge of misinformation since the start of the pandemic. We share only information that is based on scientific research. We want to create a space for discussing the effectiveness of vaccines and confront theories promoted by vaccine sceptics with real scientific data.

We conducted studies to learn more about the opinions of people opposed to vaccines against COVID, as well as more established ones such as the flu and tetanus vaccines. We wanted to find out whether there are links between scientific consensus on vaccine efficacy and popular opinion. We also investigated how strong these links are in different social groups, for example politically-engaged individuals, people with conservative or progressive views, etc. We will be able to report our findings in early 2022.

### **Studying the attitudes of Copernicus's own team towards the COVID vaccine**

We also wanted to learn about our team's attitude. The questionnaire was filled out by 226 individuals. 94% of respondents reported positive feelings about the COVID vaccine and are vaccinated or intend to get vaccinated. The State of Science Index 3M for the whole of Poland revealed that when it comes to pandemic-related issues, Poles mainly trust their friends and family (65%). At Copernicus, this number is just 18%; we trust scientists (87%). The nationwide study conducted by the Centre for Public Opinion Research in December 2020, 69% of respondents stated that their main reason for being concerned about the vaccine is potential side-effects.

## **Study into learning processes**

### **ROSES project**

Relevance of Science Education – Second (ROSES) is an international comparative project aiming to elucidate factors affecting the learning of science and technology among teenagers. The results indicated that students perceive science as a collection of important but distant and abstract information, and while learning at school is interesting it has no impact on their everyday lives. One of our main goals is to find ways to change this attitude.

### **Creative skills of teachers participating in the Science for You competition**

As they work on educational aids as part of the Summer Design School programme, teachers become creators since they design, build and test their projects. We wanted to learn about this creative process and what determines its outcome. We tested teachers' skills essential in picking challenges and implementing them effectively. It turned out an essential element was a positive perception of their own ability to rise to challenges and their readiness to change their ideas, introduce changes and manage emotions.

### **Studying the mechanisms giving rise to inequalities, and overcoming those inequalities, in science capital among students and teachers, in towns included in selected activities implemented as part of the Science for You programme**

Underway since 2015, the study allows us to examine the underlying causes of inequalities in the distribution of science capital. We look at ways in which children, parents and teachers, as well as organisations (including schools and institutions such as the Copernicus Science Centre) can work on bolstering the science capital of students in towns with less than 100,000 residents.

In 2021 we conducted field studies in two towns characterised by different access to resources (finance, educational infrastructure, availability of extracurricular activities) which may affect students' educational capital. We noted two key strategies of building educational capital.

In towns where resources are scarce, respondents state that they can only achieve their goals through hard work. This strategy shapes individuals’ sense of agency and their belief that education is important. However, children with a lower level of science capital (for example, whose parents are less well educated) have lower aspirations and expectations from the start.

In towns with a wide range of educational activities, students readily take part in extracurricular clubs and competitions. However, they are frequently not truly engaged and expect gratification through higher grades. This in fact doesn’t improve their science capital, because they would also need to have positive attitudes and beliefs in education.

Research work done as part of the “Science for You” programme, implemented and financed as part of a joint programme of the Ministry of Science and Education and the Copernicus Science Centre under the banner “Science for You”. The programme is financed by the Ministry of Science and Education under agreement No. 1/CNK-Nr 1/CNK-NAUKOBUS/2020 signed on 6 March 2020. The “Science for You” programme includes the Educobus and Planetobus activities and online classes.

Research publications by the staff of the Copernican Revolution Lab

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2. Itowiecka-Tańska, I., Potęga vel Żabik, K. P. (2021). Kopernik na horyzoncie: zdalne zająćcia w centrum nauki [Copernicus on the horizon: remote learning at a science centre]. In S. Dylak (ed.), *Wspólna szkoła*. PCSS PAN w Poznaniu. <https://wspolna-szkola.pcss.pl/> <<https://wspolna-szkola.pcss.pl/>>
3. Itowiecka-Tańska, I., Gop, A. & Jaskulska, S. (2021). Projektowanie pomocy edukacyjnych: transformacyjna wartość procesu. Narracje nauczycielek i nauczycieli o własnym uczeniu się podczas stacjonarnych i zdalnych Letnich Szkół Prototypowania [Designing educational aids: the transformative value of the process. Teachers’ narratives about their own learning during on-site and remote Prototyping Summer Schools]. *Studia Edukacyjne*, 62, 169–186. DOI: 10.14746/se.2021.62.1
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In preparation:

1. Itowiecka-Tańska, Łukianow, Karwińska. Kapitał naukowy jako zasób modernizacyjny: potencjał uczniów małych miast [Academic capital as a modernizing resource: the

potential of small town students] – planned submission date: 7 January 2022, *Przegląd Socjologiczny*

2. Itowiecka-Tańska, Potęga vel Żabik, Gop. Teachers as exhibit designers: the educational value of the process. Submitted for the volume *Amplifying Learning*, Routledge. Article under review, publication planned for the fourth quarter of 2022.
3. Zielińska, Lebuda, Karwowski, Gop, Tańska. Teachers as creators: the process of creating new teaching aids (working title, publication in English or Polish, to be submitted in February 2022).
4. Gop, Tańska. Parental scaffolding during early childhood experimentation (working title, publication in English or Polish, to be submitted in January/February 2022)
5. Potęga vel Żabik, Gop, Itowiecka-Tańska. Motivation towards science career choice and future career plans of Polish adolescents. (working title, publication in English, to be submitted in April 2022)
6. Potęga vel Żabik, Itowiecka-Tańska, Brzezicka. Stereotyping of science and scientists and career aspirations of small town school students. (working title, publication in English, to be submitted in May 2022)
7. Potęga vel Żabik, Gop, Itowiecka-Tańska. The learning environment of Polish students from small towns. (working title, publication in English, to be submitted in June 2022)



# To mobilize people around important science-related topics

The pandemic is a time of great uncertainty, further compounded by gossip and fake news. The climate crisis is bringing fear to many and massive effort is required on the global scale to slow down its progress. We believe that our role as a science centre is to provide space for discussion so people can express their concerns and confront them with the latest scientific knowledge, so as to help them make rational decisions.

## *To promote evidence-informed practices and attitudes.*

### Target: Coronavirus

As part of the cycle “Target: Coronavirus”, we were joined by the Polish Academy of Sciences (PAS) in hosting 21 online meetings with experts in the field. Our common goal was to dispel various concerns regarding the COVID vaccine. The meetings were freely open to all participants. We are extremely grateful to PAS experts for giving their time and sharing their knowledge for the public good. Each event began with a half-hour lecture followed by a Q&A session. The experts discussed the latest issues and controversies. They talked about subjects such as the “virus of misinformation”, herd immunity and reasons why people may refuse the vaccine. They provided accessible explanations of complex issues, for example the development of immune response, citing the latest research – frequently their own. Any and all questions and doubts were taken seriously. Each meeting was introduced by a short summary of rules for the chat, with questions of any sort being encouraged but abuse not to be tolerated. The moderators made sure the rules were followed and that all discussions were held in a polite, respectful atmosphere.

The meetings were attended by around 2700 participants (130 per meeting on average). Unfortunately, the vast majority were vaccinated individuals from large cities, aged between 30 and 50, holding a higher education degree. We say “unfortunately” here because we’d hoped to have the chance to convince more people who harboured significant doubts about the vaccine.

The most common reason given for joining the meetings was an interest in science and medicine (75%) and a desire to meet scientists (56%). Additionally, 63% of the attendees were keen to learn the latest news about the pandemic, and 34% were looking for answers to doubts regarding vaccination. These reasons were reflected in the attendance figures, with the most popular meetings being “Vaccines: How to make the right decision?”, “Who does the fourth wave threaten: the impact of the vaccination programme on the current situation in Poland”, “How does the immune system respond to the vaccine?” and “mRNA vaccines in the fight against the pandemic”. All participants, including vaccinated individuals, had varying questions and concerns.

The audience asked a total of 272 question (an average of 13 per meeting). They mainly concerned the safety and effectiveness of vaccines, immunity, susceptibility to disease and complications of COVID infection. 75% of participants reported that they were satisfied with the answers. The appreciated the expertise of the guests and the high calibre of discussion about the science involved, the fight against misinformation, and the infodemic. The participants also communicated with one another in the chat. This shows that the cycle has served as an invaluable source of information and a space for free discussion.

We saw very few comments from people who distrust science. Our observations reveal that they are more interested in information that confirms their beliefs. The highest numbers of vaccine sceptics attended the meetings that addressed the issues of the psychological sources of vaccine refusal, misinformation and covid treatment. However, they weren’t there to seek information but to express their own opinions. Entering into dialogue with people with such views is a major challenge still being explored by individuals and institutions specialising in science communication. We discussed the topic during the “Interaction – Integration” conference (more on the 2021 conference below).

#### Comments from our audience

- *Thank you for this whole cycle of meetings. They are really helpful as we are constantly bombarded with misinformation and empty promises.*
- *Thank you, they were wonderful meetings which I heartily recommend – mainly (sadly) within my own bubble, but also outside it.*
- *I’m a doctor and I need reliable sources of information for people who have doubts about getting vaccinated.*
- *The clear, informative format of the lectures has been great for quelling my fears of the pandemic, some of which are normal given the situation, while others are driven by the ever-present misinformation.*
- *You’re doing a great thing. The science is getting across to people, even though it’s clear from some individuals’ comments that they’d been exposed to lies and myths which can be difficult to shift.*
- *Thank you for the lectures and answers to all the questions. It’s great to be able to go back to the previous events and recommend them to others.*
- *I’m a teacher and I’m really interested in how to get help from scientific circles. I don’t think we really teach students to think for themselves, or certainly not enough.*

All the meetings were recorded and they are available at the YouTube channels of the Copernicus Science Centre and the Polish Academy of Sciences. They have been viewed over 120,000 times by January 2022. Our forecast of around 40,000 views has been vastly exceeded. The meeting with Dr. Tomasz Smiatacz on the effect of the vaccination programme on the pandemic in Poland, held in the autumn, has been viewed a record 10,802 times.

At the end of the cycle (December 2021), we produced a guide to the meetings in a Q&A format, containing links to excerpts from YouTube recordings where experts discuss the given issue.

We worked with the Education Office of the Capital City of Warsaw to prepare an interactive document comprising a description of the cycle and a list of all meetings with links to be used by teachers in schools.

**The guests of the “Target: Coronavirus” cycle were:**

**Prof. Jerzy Duszyński**, President of the Polish Academy of Sciences

**Dr. Magdalena Rosińska**, epidemiologist at the Department of the Epidemiology of Infective Diseases at the National Institute for Public Health

**Dr. Tomasz Smiatacz MD**, expert in internal medicine and infectious diseases, Director of the Department of Infectious Diseases at the Faculty of Medicine at the Medical University of Gdańsk

**Prof. Krzysztof Pyrc MD**, virologist, molecular biologist and leader of the ViroGenetics research group at the Małopolska Biotechnology Centre at the Jagiellonian University

**Dr. Aneta Afelt**, health geographer at the Interdisciplinary Centre for Mathematic and Computer Modelling at the University of Warsaw

**Dr. Wojciech Paczos**, economist, Assistant Professor at the PAS Institute of Economics and Assistant Professor at Cardiff University, UK

**Dr. Paweł Zmora**, virologist, molecular biologist and Assistant Professor at the PAS Institute of Bioorganic Chemistry in Poznań

**Prof. Piotr Trzaskowski MD**, immunologist specialising in immune disorders, director of the Faculty and Department of Medical Immunology at the Medical University of Gdańsk

**Prof. Mirosław Czuczwar MD**, anaesthetist specialising in intensive care, director of the 2nd Clinic of Anaesthetics and Intensive Care at the Medical University in Lublin

**Prof. Małgorzata Kossowska**, psychologist, director of the Department of Health Psychology at the Institute of Psychology of the Jagiellonian University

**Prof. Jacek Jemielity, biochemist**, director of Laboratory of Bioorganic Chemistry at the Centre of New Technologies at the Faculty of Physics at the University of Warsaw

Dr. Magdalena Okarska-Napierata MD, paediatrician at the Department of Pediatrics with Medical Assessment at the Medical University of Warsaw

Dr. Kamila Ludwikowska MD, paediatrician at the Department of Paediatrics and Infectious Diseases at the Jan Mikulicz-Radecki University Hospital in Wrocław

**Dr. Krzysztof Tomasiewicz MD**, specialist in infectious and tropical diseases, hepatologist, director of the Department of Infectious Diseases at the Public University Hospital No. 1 in Lublin

**Prof. Wojciech Szczekliak MD**, specialist in internal medicine, anaesthetist, clinical immunologist, specialist in intensive care, director of the Intensive Care and Perioperative Medicine at the Collegium Medicum at the Jagiellonian University

**Prof. Grzegorz Gielera MD**, Major-General of the Polish Armed Forces, specialist in internal medicine, cardiologist, director of the Military Medical Institute in Warsaw



**Science Picnic**

The 24th “Science Picnic of Polish Radio and the Copernicus Science Centre” event was held online under the banner “Climate and Us”. The scientists attending the picnic worked hard not to project too gloomy a picture. They demonstrated how science and technology can help us adapt to new conditions and halt further temperature rises by presenting facts and research results and explaining the phenomena responsible for the changing climate on our planet.

| Science Picnic at a glance   |
|--|
| <ul style="list-style-type: none"><li>• Our youngest guests conducted experiments under parental supervision, drawing inspiration from the picnic atmosphere. They also watched films and animation on the natural world.</li><li>• Fans of “maker culture” (hands-on tinkering) had chances to learn how to make insect hotels and an installation to collect rainwater.</li><li>• We hosted workshops in weaving, making new paper from wastepaper, planting seedlings and making cosmetics.</li><li>• There were plenty of experiments, both perennial favourites and those focusing on this year’s theme. They explored issues such as smog, carbon dioxide emissions and melting glaciers.</li><li>• Patrycja Rozwonkowska from the March for Science Foundation and the climatologist Prof. Szymon Malinowski answered questions about the climate crisis.</li></ul> |



Moving the Picnic online was a major challenge. We knew that nothing could truly replace the experience of conducting hands-on experiments in the great outdoors. However, the great sentiment we harbour for this event, which gave rise to the Copernicus Science Centre, meant we couldn't possibly cancel it during the second year of the pandemic. Fully aware of the challenges and limitations, we decided to go ahead with an online Science Picnic.

The event was held on several websites at the same time. [www.pikniknaukowy.pl](http://www.pikniknaukowy.pl) hosted 110 virtual tents available for the entire week (8–15 May). By clicking on each institutions, participants could watch all their films. There were over 300 videos in total!

The Picnic culminated at the weekend of 8–9 May, when we held live streams throughout the day, available on the Facebook pages of the Copernicus Science Centre and the Science Picnic and on Copernicus's YouTube channel. We created a purpose-built studio on the patio by Copernicus where we hosted discussions with guests, conducted experiments and introduced the most interesting videos. Live meetings were divided into three blocks, focusing on the youngest viewers in the morning, presenting the best experiments around lunchtime and providing content for older viewers in the afternoon. The Saturday finished with a display of the night sky streamed live from our planetarium, and on Sunday we closed with a science demonstration focusing on climate. At the same time, various other platforms hosted online workshops and meetings with experts.

By May we were all longing for meetings in person, and cultural life online was no longer as popular as it had been at the start of the pandemic. Despite all this, the Picnic was very warmly received, as shown in comments and chats.

Transmissions from our outdoor studio on 8 and 9 May were watched 14,617 times.

The 110 virtual tents on the Picnic's website were visited by 75,178 people (269,918 clicks). The films from the 24th Science Picnic were viewed a total 116,819 times.

The 24 Science Picnic was co-financed from the programme "Social Responsibility of Science" of the Minister of Science and Education.

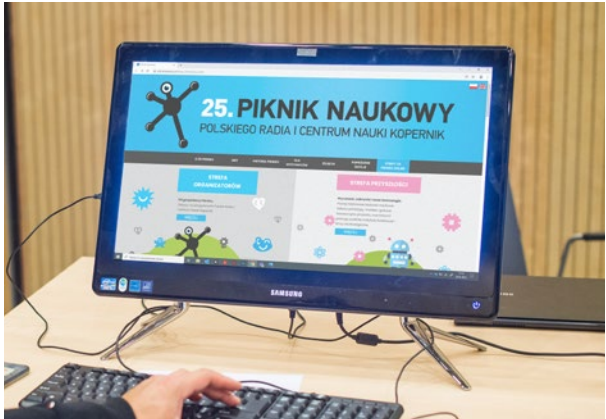
**Comments:**

- *The energy of the Picnic is infectious. Now my kids want to repeat all the experiments, and go through them all again tomorrow!*
- *We made a sundial with our kids and marked all the hours. Our five-year-old is curious if it will show the same results tomorrow.*
- *Fascinating lectures and experiments. And a delightful atmosphere, as usual!*
- *My seven-year-old was delighted :-)* We can't wait for tomorrow!
- *You're fantastic. Thanks for all the inspiration, knowledge and passion.*
- *Thank you for the lectures and answers to all the questions. It's great to be able to go back to the previous events and recommend them to others.*

- *The picnic encouraged my son Franio to conduct experiments. We sat in the garden until the evening and looked at different plants through a water droplet.*
- *We've never been to the Picnic although we've always wanted to come. It's just too far to travel from Szczecinek. The virtual tents meant that this time we could experience some of this atmosphere!*



We streamed the Picnic from the outdoor studio on our patio. We encouraged participants to conduct experiments in their own gardens and gave them ideas for what to do.



Our exhibitors pitched virtual "tents" on the Picnic's website. Visitors could pop in at any time.



We looked for signs of life between pavement slabs, examined plants under a microscope and built a composter using earthworms.

Przemiany Festival

The motto of this year’s “Przemiany Festival” was “The Climate is Changing Us”. We analysed different strategies of coping with the climate crisis and how best to limit emissions of greenhouse gases. We discussed sustainable management of natural resources and the environmental footprint of contemporary civilisation. We presented the latest scientific and technological advances which aim to halt global warming whilst ensuring continued socioeconomic growth. We showed that different communities are able to make changes and take up new, effective action.

The festival was conducted in a hybrid format, with the majority of lectures and debates streamed online. This is likely why the attendance was low, with just 850 individuals attending in person. The opening lecture was watched online by 113 people and streams of meetings were viewed 8,726 times. After the meetings, presenters answered questions from guests at the auditorium and from online viewers.

What the lecturers said

*How we view particular scientific claims depends to a large extent for most of us on how they mesh with our other beliefs. Doubts are not motivated by uncertainty and unbelief in science, but by belief in a certain politics and ideology. We are all influenced by what the people around us think and feel and say. So just talking about why you care about climate change, why it matters to you, can make the difference.*

Prof. Naomi Oreskes,  
historian of science at Harvard University

*A key condition for stabilizing global warming and limiting the rising sea level is to reduce emissions of CO2, methane and other greenhouse gases in the next decades. That can also improve air quality. We could notice the effects in a few years.*

Dr. Valérie Masson-Delmotte,  
climate scientist from the Intergovernmental Panel on Climate Change (IPCC)

*The real challenge of the 21st century will not be to turn green, it will be to turn circular. Circularity means that at every step of the process of production we’re making sure to use less resources. It means that we extract less, produce more economically, learn to share goods and repair broken devices, and look for new recycling technologies.*

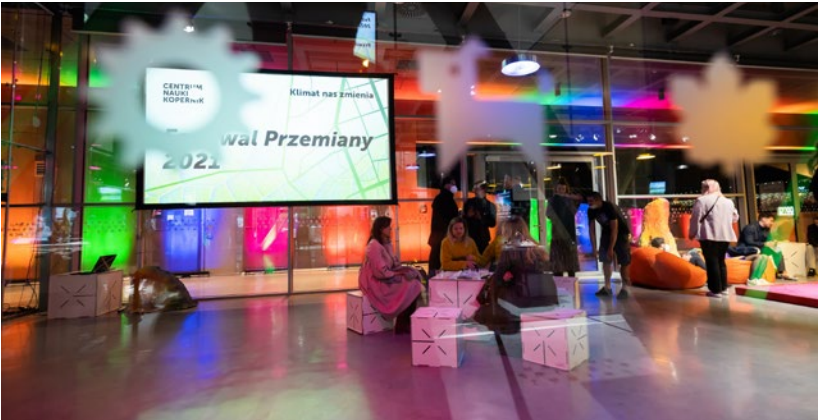
Guillaume Pitron,  
journalist and documentary filmmaker

Partners of the 2021 Przemiany Festival

Austrian Cultural Forum • French Institute in Warsaw • US Embassy • British Council • Atomic Forum Foundation • Daily Art • Film School in Łódź • VN Lab • New Horizons



During debates, the audience talked to experts about scientific and technical matters as well as social, cultural and geopolitical issues surrounding energy transition.



The Przemiany Cinema screened documentaries about climate research, climate activists and the impact of the climate crisis on economic systems, oil companies, nuclear energy and the ecosystem.



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Crème brûlée made of crickets and seaweed? The festival menu served dishes using plant and local produce.



# *To inspire and lead dialog on global and local challenges at the intersection of science and society.*

## **Educational activities accompanying the “Future is Today” exhibition**

The topics explored at the exhibition “The Future is Now” (more in the section “To provide the highest quality experience for a safe number of visitors and for those enjoying Copernicus online”) inspired us to develop an educational programme. We started working on it back in 2020, before we launched the exhibition.

In 2021 we held seven workshops for teachers, five of which were held online. We talked about AI and state-of-the-art technologies and how they impact our lives. We worked together on identifying topics to explore during school lessons and how to best engage students. It turned out that it wasn’t just teachers of natural science subjects who found it useful – teachers of other subjects including the humanities also found it valuable.

When we launched the exhibition “The Future is Now: Digital Brain?”, we invited teachers to Copernicus. The last two workshops were held in the exhibition space itself. Our guests expected demonstrations resembling our previous exhibitions, but were surprised to find that our new exhibits presented them with brand-new challenges, requiring reflection and not providing ready answers to their questions. Some found this off-putting and discouraging for experimentation, while others embraced it. The most popular exhibits were Robobobo (our robotic baby), the Last Moment Robot (an end-of-life care machine) and Santo (Sanctified Theomorphic Operator).

The workshops for teachers are intimate, bringing together around 15 people. In 2021 also we also held a seminar for teachers and educators during the “Lay Out – Let Out” conference (more in the section “To support the development of competencies for the future”). The 100 participants had an opportunity to meet Robobobo and learn more about the programme and exhibition.

We also held workshops for students aged 12 and 13 at primary and secondary schools. Each of the three online meetings was preceded by a short film screening. They included a video about a school in China where AI technology uses sensors to monitor students’ concentration levels, a documentary about robots assisting elderly people and films about the Internet of Things. After the screenings, the children asked questions and we opened up discussions. Since young people spend most of their time steeped in the latest technologies, we expected them to impress us with their understanding of AI. That was far from being the case. It turned out that they had rarely stopped to consider why their smartphones seem to be so powerful. The last meeting was held at the exhibition “The Future is Now: Digital Brain?” Before attending the exhibition, we asked the young people to answer a few simple questions, such as whether they think they

themselves have an impact on how technology develops. They answered the questions again after attending the workshops. In a few instances, their answers changed. We were delighted to find out that the students understood that they could affect far more than they previously realised. Our meetings encouraged them to reflect and discover their own agency.

We held similar meetings in other regions in Poland in collaboration with NASK. Four were held online, and one took place during the UN Internet Governance Forum (IGF 2021). This important event also featured an interactive discussion panel on AI where we talked about our “The Future is Today” exhibition and the linked educational programme.

Workshops featuring elements of the design thinking were attended by young people, educators from Copernicus and experts from NASK. We joined forces to look for topics worth exploring further at school.

Our suggestions included:

- AI in phones, apps and laptops.
- Role-playing games as a source of information on AI.
- Using AI to fight the pandemic.

The recommendations developed during this meeting helped us prepare future workshops and lesson plans. The Nationwide Educational Network platform is currently presenting two scenarios, with at least a further five to be published in 2022.

The exhibition forms a part of the project “Educational and information campaigns for disseminating benefits of digital technologies” implemented by the Chancellery of the Prime Minister in conjunction with the NASK National Research Institute and the Copernicus Science Centre.

## **The “Integration – Interaction” conference**

We are active participants in the science centre community in Poland and abroad. We are members of associations such as the European Network of Science Centres and Museums (ECSITE) and the SPiN association. We attend industry conferences to maintain relationships, exchange ideas and forming new initiatives.

The regular conference of Society and Science Association (SPiN) brings together institutions and organisations in Poland whose aim is to build a creative, innovative, engaged society interested in science and state-of-the-art technologies. Each edition is hosted by a different member of SPiN. In 2021, the meeting was held at the Copernicus Science Centre under the banner “Communicate, Don’t Panic!” Our 150 or so guests explored how to discussed topics relating to future social challenges. Special guests included the futurologist Dr. Aleksandra Przeglasińska, the sociologist Dr. Tomasz Sobiejski, the philosopher Dr Łukasz Lamża and the physicist Dr. Aleksandra Kardaś.

The ongoing deluge of misinformation makes it difficult to make decisions rooted in facts. So how should we build trust? How do we engage sceptics? How do we listen with empathy and provide sensitive answers? How do we look after ourselves on the front lines of the battle against misinformation? We considered all these and other questions during the conference.

The first in-person meeting since the start of the pandemic allowed us to explore our pent-up emotions, share experiences of the last two years and consider how we could use them in communicating the next potential crisis. The conference involved more than the usual number of participants from scientific institutions and universities (18 participants). Their take on science communication expanded our perspectives.

The conference was co-financed from the programme "Social Responsibility of Science" of the Minister of Science and Education.



At the "Interaction-Integration" conference, we gathered in larger and smaller groups. We were pleased to be able to meet one another "in real life" once again.



# To provide funding for activities and development.

The Copernicus Science Centre’s operational costs for 2021 were 54,514,723,91 zlotys. Institutional subsidies covered 59.5% of the total amount, while the remaining part is financed from our own income. We have developed a plan for systematically increasing that income, year on year. This focuses on ticket sales, harnessing targeted subsidies for key projects, obtaining funding from sponsors and selling products and services.

## Ticket sales

We are aiming to return to pre-pandemic visitor numbers (over a million per year) by 2023. Our forecast income from ticket sales in 2021 was 8.5 million zlotys. Despite the pandemic, we were able to bring in a total of 11.3 million zlotys. We are delighted that our efforts paid off and the public trusted us enough to come back (more about visiting in safety in 2021 in the section on “Providing a top quality experience for a safe number of visitors and for virtual visitors”).

## Income from fundraising, sales and leasing of premises

Funds obtained from our sponsors, individual donors, sales of products and services and leasing support Copernicus’s programme activities. The total amount we aimed to raise from these funds in 2021 was 6 million zlotys.

## *To increase income from fundraising and from products and licensing sales.*

In order to reach our goals, such as regularly increasing salaries (more in the chapter “Ensuring continuous operations, agility and developmental potential”), in 2021 we launched a long-term plan of increasing our income through fundraising. In 2021 we raised 3.2 million, matching the total raised in 2019. In 2021 we reached our target of

raising 4.1 million zlotys through fundraising and sales of products and services. This has been the highest level in many years, in spite of the pandemic.

The main part of our fundraising income comes from our sponsors. The total is 3.1 million, of which 2.9 million is direct income as part of sponsorship agreements. The remainder was raised through working with other partners and from individual donations. The pandemic meant a decreased interest in our existing products and services, therefore we decided to expand their range, raising an additional 900,000 zlotys. Our highest income comes from selling licences for our education kits: Modular Natural Science Labs (four kits) and Multilab Physics. The remaining income comes from sales of scientific demonstrations, licences for planetarium displays, leasing the mobile exhibition “Captured Mind” and online products such as laboratory classes, virtual tours and products commissioned by partners.

The pandemic meant that maintaining income from leasing premises was our greatest challenge. We hoped that the market situation would return to normal in 2020. However, in view of the ongoing crisis we were forced to reduce our rental income more than planned, otherwise we would have struggled to maintain long-term partnerships with our leaseholders (the bistro and museum shop). Much like in 2020, restrictions on holding events also meant that our conference centre saw fewer bookings. We achieved an income of 1.1 million zlotys out of the projected 1.9 million.

### Strategic Partners and Supporting Partners

#### Samsung Electronics Polska

Strategic Partner, Exclusive Partner of the Robotics Theatre, Temporary Exhibition Partner, Partner of the After-Hours events for adults by Samsung

#### PLUS

Supporting Partner, Exclusive Partner of the Buzzz! exhibition

#### E.ON Polska S.A. (formerly innogy Polska S.A.)

Supporting Partner, Exclusive Partner of the High Voltage Theatre

### Partners of the exhibition space

#### Raytheon Technologies

Exclusive Partner of the Robotics Lab, Exclusive Partner of the EduFactory

#### BASF

Exclusive Partner of the Chemistry Laboratory

### Special project partners

**Embassy of the Netherlands** – partner and honorary patron of the exhibition “Bicycles”

**Boeing** – partner of the CANSAT competition and partner of the Constructors of Dreams programme

**BNP Paribas Bank Polska S.A.** – partner of the cycle of environmental demonstrations at the Copernicus Science Centre

**BOŚ Foundation** – funder of the modular natural science kits “Air Quality” in the project “YEC Researchers”

**GlaxoSmithKline** – partner of the Air Bubble installation and accompanying exhibition

**Mercedes-Benz Poland** – partner of the first part of the exhibition “The Future is Today: Digital Brain?”. The company provided an autonomous concept car, the F015 Luxury in Motion.

*To secure specific purpose grants for carrying out the most important projects.*

**Income from target subsidies**

In 2021 we spent a total of 42.1 million zlotys of our targeted subsidies on the construction and fitting-out of the building of the Copernican Revolution Lab, as well as part of the Educational and Information Campaigns project (“The Future is Today” exhibition and accompanying educational programme), the SOWA initiative and the “Science for You” programme.

- In 2021, we received a targeted subsidy of 3.5 million zlotys from the Minister of Science and Education to fund the “Science for You” programme. We dedicated 3.4 million zlotys of this subsidy to the latest edition of the programme.
- The targeted subsidy from the Minister of Science and Education for the SOWA initiative for the period 2020–2023 is in excess of 43 million zlotys. In 2021, we launched a survey to select SOWA centre locations in 30 towns throughout the country, and launched the first two in Piotrków Trybunalski and Raciborz. We also started producing exhibits and procuring equipment for future locations. The total spending on these activities in 2021 was 12 million zlotys.
- The Capital City of Warsaw provided a targeted subsidy of 27.7 million zlotys in 2021, of which we dedicated 15.5 million zlotys to the construction of the Copernican Revolution Lab building. In 2021, we dedicated 3.6 million zlotys of the 16.7 million received as co-financing from the Regional Operational Programme of the Mazowsze Voivodeship for 2014–2020.
- We launched the first module of the exhibition “The Future is Today” and its accompanying educational programme thanks to a subsidy of over 2.6 million zlotys. The programme is implemented in collaboration with the NASK National Research Institute as part of the Educational and Information Campaigns programme, and the

subsidy originates from the Operational Programme Digital Poland for 2014-2020. The total subsidy for the 2020-2022 period is 9 million zlotys.

- Since the 2014-2020 financial period is over and we are no longer able to seek co-financing for the development of the Biodiversity Garden project from EU funds, it has not yet started. However, we have not given up on the concept of the Biodiversity Garden and we are seeking a different source of funding.



# To ensure space for R&D activities and offices.

## *To build and outfit the building of the Copernican Revolution Lab.*

In January 2021, the building of the Copernican Revolution Lab barely protruded above ground level, with just the foundations and an underground tunnel having been finalised. By the summer, the steel construction was completed with skylights and pergola mounted on the roof. Final touches were being added to the façade, and the roof of the Copernican Revolution Lab was topped out on 30 September.

December saw the completion of work on the interiors. Construction is on schedule, and we are currently working on fitting out the interiors. Opening day is nearly here!

Unfortunately the costs of the building work are exceeding expectations. The original contract signed with the Contractor (Unibep S.A.) estimated building costs at 841,912.35 zlotys. It transpired that additional work was required during construction, increasing costs by a further 200,229.35 zlotys net in 2021 (to cover formally documented necessities).

### **ETFE façade**

The building façade is covered with air-filled cushions made of ETFE (ethylene tetrafluoroethylene).

The polymer is much lighter than glass, as well as being highly resistant to corrosion, pollution and extreme temperatures. It lets through between 90 and 95% of light and has excellent thermal insulation properties. The production and transportation of ETFE membranes is significantly more environmentally-friendly than many other materials. It is recyclable, and can be reused for new projects.

The Copernican Revolution Lab is covered with 256 ETFE plates, which were transported on just two lorries. In comparison, moving an equivalent volume of glass would have required 15 lorries.

**What will we do at the Copernican Revolution Lab?**

- Develop educational solutions for STEAM subjects, including exhibits, educational aids and work models.
- Develop formats of communicating science and assess how they shape attitudes of participants and users of the solutions.
- Develop methods of designing educational solutions by harnessing the potential of co-creation (involving future users in the development process).
- Develop understanding of learning environments and scientific and educational practices of students and teachers.

### **Building equipment**

In August 2021, we received proposed interiors designs from Heinle, Wischer und Partner Architects and launched the procurement process (e.g. bidding for ready-made furniture).

The new building will also be fitted out with furnishings we already own, some of which are currently used by some of Copernicus’s team in offices rented in the city centre. The budget for interior design and fittings is approx. 3,000,000 zlotys.

As well as standard office equipment, the Copernican Revolution Lab also needs laboratory fixtures, specialist tools for conducting experiments and fittings for workshop spaces. In 2021, we finalised the acquisition of a compact kit for conducting field observations including recording, encoding and analysing audio and video materials, which also helps recognise emotions. It can be linked to an integrated research and analysis system. The kit cost 161,920 zlotys net.

The remaining equipment, including laboratory fittings and furnishing, specialist software and machinery for the workshop (e.g. a CNC milling machine, welding equipment and lathe), will be purchased in 2022. The budget is approx. 8,612,771 zlotys.



### What's inside?

- Interdisciplinary research laboratories equipped with state-of-the-art instruments and apparatus, and educational laboratories.
- Space for studying and testing scenarios and products under conditions resembling school classes and private homes.
- FabLab – a workshop space for hosting construction classes for children and adults.
- Electronics, CNC and carpentry workshops for developing prototypes and final products.
- Development labs used by teams working at the Copernican Revolution Lab and as seminar rooms.
- Office space, allowing us to vacate offices rented in the city centre and move the entire Copernicus team to the main site on Wybrzeże Kościuszkowskie Street.



Artist's impression of the interiors of the Copernican Revolution Lab

How the Copernican Revolution Lab has changed over the course of the year.



Together with members of the Copernican Revolution Lab consortium, we are conducting R&D activities and developing and launching products. The other members of the consortium are **Moje Bambino Sp. z o.o. Sp. k.** and **BeCREO Technologies Sp. z o.o.**

Our activities are also supported financially by our partners. The Main Partner of the Copernican Revolution Lab is **Samsung Electronics Polska Sp. z o.o.**, and the Investment Partner of the Copernican Revolution Lab is **Saint-Gobain Poland**.

We have also received co-financing of 16,765,42 zlotys from the European Regional Development Fund as part of the Regional Operational Programme of the Mazowsze Voivodeship 2014-2020, Priority Axis and utilising R&D activities in the economy, Action 1.1 Research and development activities at scientific institutions – Project co-financing agreement no. RPMA.01.01.00-14-9876/17-00 signed on 31 October 2018.

Further co-financing of 1,100,000 zlotys has been declared jointly by the consortium members BeCREO and Moje Bambino and project partners Samsung Electronics Polska and Saint-Gobain Poland.



In July 2021, the building site was visited by Rafał Trzaskowski, Mayor of the Capital City of Warsaw.

The total cost of building and construction work is approx. 82,174,000 zlotys (gross).

Our own financial contribution is in excess of 37,718,000 zlotys.

The Capital City of Warsaw is supporting the project by providing the plot for the building site and co-financing the development to the sum of 27,690,101 zlotys from a targeted subsidy no. C/OM/VII/P3/99/U-263/2018-2021 dated 31 October 2018.

# To ensure continuous operations, agility and development potential.

We aim to constantly improve our organisation and ensure our team is fully engaged and motivated. It is important to us that Copernicus is seen as an attractive employer offering competitive salaries and providing opportunities for professional development. We continually analyse our activities and test the effectiveness of our processes at Copernicus.

## *To build a committed team, tailored to CSC needs and capability.*

We have been struggling with staff retention for some time now. The main reason for this is that our salaries have not been competitive. Our analysis of our remuneration system identified three key problems. Firstly, the salaries offered by Copernicus were found to be unattractive in comparison with the Warsaw employment market. Senior experts, key professionals and members of the management team were the most affected by the disproportionately low wages, which was one of the main reasons for low staff retention.

Secondly, we also noted that the ratio of permanent and variable elements of our salaries had been out of balance, skewed too highly towards the variable elements.

The final issue was the great complexity of our entire remuneration structure. The total monthly salaries we offer are made up of a base salary and monthly bonus, plus variable elements of quarterly and motivational bonuses.

Our preliminary conclusions were supported by an analysis of a salary review of the Warsaw employment market and an audit by an external consultancy. In 2021, we simplified our remuneration system and increased salaries. We will assess the impact of this overhaul on staff retention in 2022.

We introduced the following changes:

- Increased salaries. We decided that in 2021 at least 70% of our salaries will fall in the median bracket of 80-120% of market rates. Following the change, over 80% of our staff fell into this bracket.
- We simplified the monthly salary system by reducing the number of components, including the monthly bonus into the base salary.
- We reduced the variable component of the total salary and are bringing it in line with similar variable salary elements in the market.

We also decided to overhaul the staff evaluation system which determines the amount of bonuses awarded. The team regards the existing system as demotivating and time-consuming. It has also been noted that the frequency of evaluation does not mesh well with the timetable of activities and projects. Not all staff members can be given appropriate quarterly targets.

The detailed audit and interviews with the management team revealed that planning and assessing targets is most effective for senior and managerial positions. Members of staff employed at lower levels are more effectively assessed according to attitudes and behaviours expected at Copernicus, such as the quality and timeliness of their work.

By working in interdepartmental teams, we have devised a new system of staff assessment customised to our requirements. The system was launched at the start of 2022. Its implementation involves information meetings, workshops supporting the development of managerial skills in terms of planning and assessing targets, and workshops on delivering and receiving feedback.

In December, we conducted an "Employee Engagement Barometer" survey to learn about our staff's motivation and engagement and the factors which shape them. We will use the results to prepare recommendations aiming to optimise the work environment at Copernicus.



# *To increase the efficiency of implementation of institutional goals.*

Given the ongoing uncertainty and unstable situation, we want to make the most of our existing resources and respond to new challenges as they arise. In spheres requiring similar competences, we will introduce organisational solutions to help us make decisions on supporting high-priority activities. We will introduce standards and tools to make our work more efficient. By honing the areas of responsibility for all organisational units and positions, we want to streamline decision-making pathways and eliminate duplicate and unnecessary tasks and activities. In 2021, we worked on improving our document collection and circulation systems.

In September, we checked how long the subsequent steps of digital invoice processing with the ELO invoice workflow software take – invoice entry and approval, checking for possible errors, and making payments. Recommendations for solutions that will reduce the document flow time and avoid payment delays will be made in early 2022.

The conclusions indicated that documentation at Copernicus is highly dispersed and difficult to access. A lack of handover procedures (e.g. no mechanism for transferring documentation when a staff member leaves) has been a major obstacle to collating documents at all stages of procurement. We are developing a filing system for all our financial documents to put them in order and ensure quick and easy access. The new procedures will mean that all documents are stored in an orderly fashion and staff have easy access to electronic files. All materials concerning a particular transaction are stored in a single place. The individual responsible for collecting full documentation is the staff member who filed the application for funding. We have also prepared templates of documents required for making purchases. In December, all personnel involved in procurement underwent training in the new systems and procedures, and the system has been put in place in January 2022.

In 2021 we noted that procurement processes at Copernicus tend to be lengthy. One of our goals for 2022 is to streamline these procedures.

## **Who are we?**

On 31 December, Copernicus employed 331 individuals (including 133 men and 198 women), together filling the equivalent of 318.23 full-time positions. The average age of our employees is 38.4 years, with 25 staff members aged under 26.

252 individuals hold higher-education diplomas, four have some post-secondary education, 47 completed secondary education, five have vocational qualifications, three completed primary education, and we have no data on the remaining 20.

In 2021, 98 of our staff members took part in training courses. Ten individuals received funding for learning a foreign language.



In December 2021, the whole Copernicus team gathered on the outdoor patio. We were warmed by the festive atmosphere and the joy of seeing one another “in real life” once again.

**Programme Council of the Copernicus Science Centre**

Prof. Łukasz Turski, Chairman (Centre for Theoretical Physics, Polish Academy of Sciences)

Prof. Aleksander Bursche, Deputy Chair (Faculty of Archaeology, University of Warsaw)

Prof. Marek Abramowicz (Prof. Emeritus, Chalmers University, Göteborg)

Prof. Roman Cieślak (Rector, SWPS University of Social Sciences and Humanities, Warsaw)

Prof. Magdalena Fikus (Prof. Emeritus, Institute of Biochemistry and Biophysics, Polish Academy of Sciences)

Catherine Franche (Executive Director, ECSITE European Network of Science Centres & Museums)

Maya Halevi (Director, Bloomfield Science Museum in Jerusalem)

Prof. Dariusz Jemielniak (Director, MINDS Faculty, Koźmiński University, Warsaw)

Maria Mach (President of the Board, Polish Children’s Fund)

Mirella Panek-Owsiańska (expert on corporate social responsibility and social communication, founder of the Space for Girls Foundation)

Prof. Tomasz Sowiński (Institute of Physics, Polish Academy of Sciences)

Dr. Barbara Streicher (Managing Director, ScienceCenter-Netzwerk in Austria)

Prof. Tomasz Szkudlarek (Director, Department of Philosophy of Education and Cultural Studies. Institute of Pedagogy, University of Gdańsk)

Prof. Jan Szmidt (Director, Department of Microsystems Technology and Electronic Materials, Institute of Microelectronics and Optoelectronics, Warsaw University of Technology)

Rosalia Vargas (President, Ciência Viva National Agency for Scientific and Technological Culture, and Director, Pavilion of Knowledge in Lisbon)

Hanna Wróblewska (Director, Zachęta National Art Gallery, Warsaw)

**Management of the Copernicus Science Centre**

Robert Firmhofer – CEO

Irena Cieślińska – Programme Director

Ewa Kloc – Administrative Director

Joanna Kalinowska – Development Director

Anna Dziama – Deputy Programme Director for Education

Dr. Katarzyna Młynek – Deputy Programme Director for Events (replacing Wiktor Gajewski after 30 June 2021)

Barbara Juszcak – Deputy Administrative Director and Chief Accountant

Anna Lipińska – Deputy Programme Director for Visitor Experience

Dr. Przemysław Wielowiejski – Deputy Administrative Director for Investment

Dr. Krzysztof Murawski – Deputy Programme Director for Innovation (replacing Dr. Aleksandra Wójcik-Głodowska after 31 July 2021)

**The Copernicus Science Centre is a member of the following associations:**

European Network of Science Centres & Museums (ECSITE)

Association of Science and Technology Centers (ASTC)

SPiN Association

European Science Engagement Association (EUSEA)

International Planetarium Society (IPS)

International Laser Display Association (ILDA)

EU ThinkTank

Polish Conference & Congress Association

Power of 4



**Awards we received in 2021:**

**Forbes Diamond:** Forbes has worked with Bisnode Poland for the thirteenth time to develop a list of fastest-growing companies in Poland. Copernicus is proud to have received a "Forbes Diamond 2021" ranking.

**"Openness, Courage, Responsibility" Medal** awarded as part of the celebrations of the 25th anniversary of the SWPS University in Warsaw. Copernicus is one of five partner institutions awarded the prestigious medal for contribution to the development of SWPS.

**Golden Sunflower:** We received a golden statuette in the "Nature" category for our environmental family workshops held online in June in partnership with BNP Paribas. The award followed a vote for inspirational activities for children, held by the Time for Kids Group.

**The Copernicus Science Centre is a cultural institution.**

Its organisers are the Capital City of Warsaw, the Minister of Science and Higher Education, and the Minister of National Education.

**Legal Basis**

Agreement from 1.06.2005 on creating a joint cultural institution named the Copernicus Science Centre, with annexes from 21.06.2006, 26.07.2010, 24.06.2014 and 3.11.2015.

Granted the status of a cultural institution named the Copernicus Science Centre on 1.06.2005, with amendments from 21.06.2006, 26.07.2010, 24.06.2014 and 3.11.2015.

Polish Parliamentary Act dated 25.10.1991 on organising and implementing cultural activities

**Text:**

Marcin Malesiński

**Design:**

Michał Romański

**English translation:**

Sax Translations (D. Sax, C. Stupnicka)

**Photos by:**

Natalia Arciszerwska: p. 20

Maciej Błocki: p. 75

Wojciech Dobrogojski: p. 17

Szymon Filipowicz: cover, pp. 7, 21

Mieszko Janiszek: p. 21

Jaśkowa Galeria: pp. 8, 46

Waldemar Kompata: pp. 5, 16, 17, 28, 29, 40, 42, 48, 61, 63

Robert Kowalewski: p. 42

Adam Kozak: pp. 6, 9, 17

Piotr Kruszak: p. 24

Barbara Malinowska-Pohoryles: p. 28

Franciszek Mazur: pp. 4, 16, 17, 29, 61, 63, 75, 76, 81

Jarosław Mizera: pp. 6, 33, 34

Piotr Mołędzki: p. 37

Katarzyna Nowicka: p. 75

Rafał Soliński: p. 33

Agata Steifer: p. 67

Wojciech Surdziel: p. 5

Andrzej Winkler: pp. 34, 35, 37

Stawomir Wyrębek: p. 34

**Copernicus Science Centre**

Wybrzeże Kościuszkowskie st. 20

00-390 Warszawa

[www.kopernik.org.pl](http://www.kopernik.org.pl)

Organisers



Ministerstwo  
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