COPERNICUS
SCIENCE CENTRE

Annual Report 2016

Contents

It was more than two decades ago that the American political scientist Francis Fukuyama published his book *The End of History*. In it, he famously argued that with the fall of the Berlin Wall, what we know as "history", in the sense of political development, had come to an end. Liberal democracy had won out and become a widely accepted political standard.

These days not even Fukuyama himself has any doubt that history has come full circle and is now heading in a disturbing direction. For the first time since WWII, Europe has found itself verging on disintegration. Wealthy Western societies and young democracies of Central and Eastern Europe have become infected with populism. The challenges of globalization, the migration crisis, the complexity of the modern world have come up against the intellectual helplessness of citizens, who are beginning to listen to the rhetoric of populists with growing interest. And the populists are reducing the multi-coloured reality down to just two colours: black and white. They propose reverting to the past as a simple solution to the complex problems of the present.

The unprecedented evolution of the world, which has brought about a digital revolution over the last twenty years, has been accompanied by increasing stratification. According to the World Value Survey, which studies the changing values and beliefs of citizens in almost 100 countries around the world, younger generations and more educated people are becoming increasingly liberal. People with lower social status and education, on the other hand, are sensing a growing threat to their traditional values.

Modern technology has certainly had a hand in facilitating the deepening of social divisions, the rise of extremism and the popularity of the language of intolerance. Professor Jordi Rodriguez Virgili, a specialist in political communication, has aptly referred to social media as "Petri dishes for populist movements". Short messages, packed full of emotion, with no time for calm judgment. Anyone who thinks differently than we do can just be thrown out of our circle of friends; there's no need to debate anything with them.

In these new circumstances, the role of science centres becomes increasingly important. Populism's mortal enemy is the ability to think critically – an ability we can help foster through educational initiatives. Science communication not only helps disseminate information on complex scientific issues, but it also creates a space for discussion about our future, fears and hopes. Discussion not just with scientists but with one another, as a social dialogue cutting across divisions. By striving to incorporate those social groups who are struggling to keep up with the pace of change into the activities of science centres, we can help build bridges between tradition and modernity.

The Copernicus Science Centre has redefined its vision in response to the challenges of the modern world. People shape the world by thinking critically and creatively. We fulfil our vision by adhering to our shared values: science, freedom, responsibility, trust and cooperation. I encourage you to join in and help shape our future together.

Robert Firmhofer
Director of the Copernicus Science Centre

The aim of the Copernicus Science Centre's activity is to build scientific and social capital and bring about a shift in the culture of learning, by engaging society, in particular our visitors, in a range of activities and by carrying out R&D work in this field.

WE PROVIDE A TOP-QUALITY EXPERIENCE TO A MILLION VISITORS EVERY YEAR.

WE SUPPORT THE ART OF LEARNER-CENTRED EDUCATION.

WE ENCOURAGE PARTICIPATION IN CULTURE SHAPED BY SCIENCE.

Our visitors

Since first opening its doors six years ago, the Copernicus Science Centre has been visited by over a million people every year. We are the second most frequented science centre in Europe (after the Universcience complex in Paris) and one of the top ten around the world. Our popularity is the result of our consistent policies

We continually strive to inspire the public to make observations, conduct experiments, pose questions and seek answers. That's the mission of the Copernicus Science Centre, and all our activities follow these principles. By placing the public at the centre of our activities, we continue improving our services to take into account individual styles and preferences. Since Copernicus has become an R&D centre in its own right, we not only engage our guests in learning processes, but we also study those processes.

Science centres are an ideal setting for studying the mechanisms of learning and cognitive processes in children and adults. Sociologists, psychologists and anthropologists from our Research Department analyse the ways in which visitors experience our various exhibitions, interact with individual exhibits and participate in workshops. Their work provides us with a unique understanding of the role played by science centres in how people of all ages and levels of education learn and grow. We continue developing and prototyping new educational tools, frequently drawing upon state-of-the-art technologies. The interdisciplinary research projects we undertake alongside academic partners are contributing to the development of the new fields of "learning sciences" and "visitor studies" in Poland.

In 2016, we started studying the effect of students' scientific capital on their attitude to visiting Copernicus (the project was co-financed as part of the "Culture Observatory" programme of the Polish Ministry of Culture and National Heritage); we also examine the ways in which our youngest visitors use our exhibitions and study the motivation of people choosing to visit all kinds of cultural institutions including science museums and centres. Detailed information and reports can be found at www.kopernik.org.pl under the tab "About the Centre".

In 2016, we launched the "Science Live" programme involving scientific research and experiments being held in the exhibition space with the participation of visitors. They enable scientists to interact with a wide range of age groups. Visitors have a chance to contribute to the advancement of scientific knowledge and learn about how research is actually done and about the roles played by representatives of various disciplines. The first study with the participation of Copernicus visitors was conducted by psychologists from the SWPS University of Social Sciences and Humanities in November. The experiment investigated the effects of competition and collaboration on problem-solving.

In June, we celebrated the first anniversary of the Copernicus Club loyalty programme for people with especially close links to the Copernicus Science Centre's mission. Members enjoy unlimited entries to the Centre, can participate in additional events and receive a monthly newsletter. The Club currently has 1615 members, including 43 individual memberships, 661 double memberships and 596 family memberships.

In 2016 we were proud to launch a newly-revamped exhibition space, renamed the "New World in Motion" gallery (more on p. 12), which was the first gallery to be comprehensively redesigned to further improve visitor experience. In late December, we also started making changes to the entrance area of the Copernicus building. The zone will be expanded and traffic will be modified so that the paths of people entering and leaving don't cross. We are also improving access to the cloakroom, and enhancing the ticket sale system to include bookings made via mobile apps as late as on the day of visit. The works should be completed in early February 2017.

In early July, we welcomed our six millionth guests: Łukasz and Małgorzata with seven-year-old Antek, from Stargard. They received family membership in the Copernicus Club and an educational tablet from Samsung Polska – our Strategic Partner.

1,099,646
people visited the Copernicus Science Centre in 2016

793,467
attended exhibitions at the Copernicus Science Centre

237,707
visited the Heavens of Copernicus planetarium

Our visitors

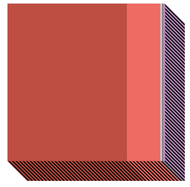
Copernicus Science Centre

Visitors by age

- **8.5%** – 0–6
- **27.4%** – 7–12
- **13.3%** – 13–16
- **8.3%** – 17–19
- **8.3%** – 20–25
- **12.3%** – 26–35
- **13.4%** – 36–45
- **5.3%** – 46–55
- **1.3%** – 56–65
- **0.2%** – 65 plus

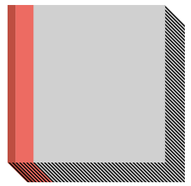
Are you generally pleased with your visit to the Copernicus Science Centre?

- **75.6%** – yes, definitely
- **22%** – yes
- **1.4%** – neither yes nor no
- **0.5%** – not really
- **0.5%** – definitely not



Visitors by region (groups)

- **5%** – Warsaw
- **11.5%** – Mazowsze voivodship (surrounding Warsaw)
- **83.5%** – other voivodships



Education level

- **52.9%** – primary/middle school
- **1.2%** – vocational
- **6.3%** – secondary school
- **33.2%** – higher

Visitors by region (individual guests)

- **18.7%** – Warsaw
- **15%** – Mazowsze voivodship (surrounding Warsaw)
- **57.2%** – other voivodships
- **2.4%** – Polish tourists living abroad
- **6.7%** – foreign tourists

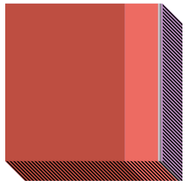
Heavens of Copernicus planetarium

Visitors by age

- **13%** – 0–6
- **37%** – 7–12
- **11%** – 13–16
- **4%** – 17–19
- **3%** – 20–25
- **11%** – 26–35
- **15%** – 36–45
- **3%** – 46–55
- **1%** – 56–65
- **1%** – 65 plus

Are you generally pleased with your visit to the planetarium?

- **76%** – yes, definitely
- **21%** – yes
- **1%** – neither yes nor no
- **1%** – not really
- **1%** – definitely not



Would you recommend visiting the Planetarium?

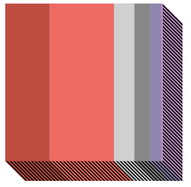
- **79%** – yes, definitely
- **20%** – yes
- **0%** – neither yes nor no
- **0%** – not really
- **0%** – definitely not

Education level

- **61%** – primary/middle school
- **1%** – vocational
- **9%** – secondary school
- **27%** – higher

Following your visit to the planetarium, has your understanding of a branch of science increased?

- **28%** – yes, definitely
- **41%** – yes
- **13%** – neither yes nor no
- **10%** – not really
- **7%** – definitely not
- **1%** – don't know



Exhibitions

Whilst studying the public, improving our team's qualifications and working with experts in exhibit design, we continually strive to focus on the most important elements of our exhibitions, the precision of presentation, the experiences of visitors, and on clean, sharp design stripped of any excessive embellishment. The re-opening of the "New World in Motion" gallery on 3 March marked the culmination of the first stage in an ambitious programme of restructuring the entire Copernicus space.

In revamping the **New World in Motion** gallery, we sought to give it a more open, multi-dimensional format. This encourages visitors to conduct experiments and pose and verify their own hypotheses, helping them search, study, sometimes make mistakes – and genuinely experience the rules of the natural world.

Studying our visitors has helped us improve our understanding of their needs. Knowing that our minds learn by repetition, we decided to limit the number of topics addressed in the gallery, while instead expanding the number of ways they can be experienced. The exhibits have been divided into thematic groups: Electricity and Magnetism, Waves and Vibrations, Gyroscopes and the Moment of Inertia, Fluids, Simple Machines, Space, and Chaotic Phenomena.

The New World in Motion gallery comprises 80 exhibits. We acquired several from two outstanding science centres – the Exploratorium in the US and Technorama in Switzerland – although the majority were designed and made at our own workshop. We honed the new exhibits by testing prototypes with our visitors. Their new design is more minimalist than before, making it easier for guests to focus on the content. We have also made the instructions more comprehensive.

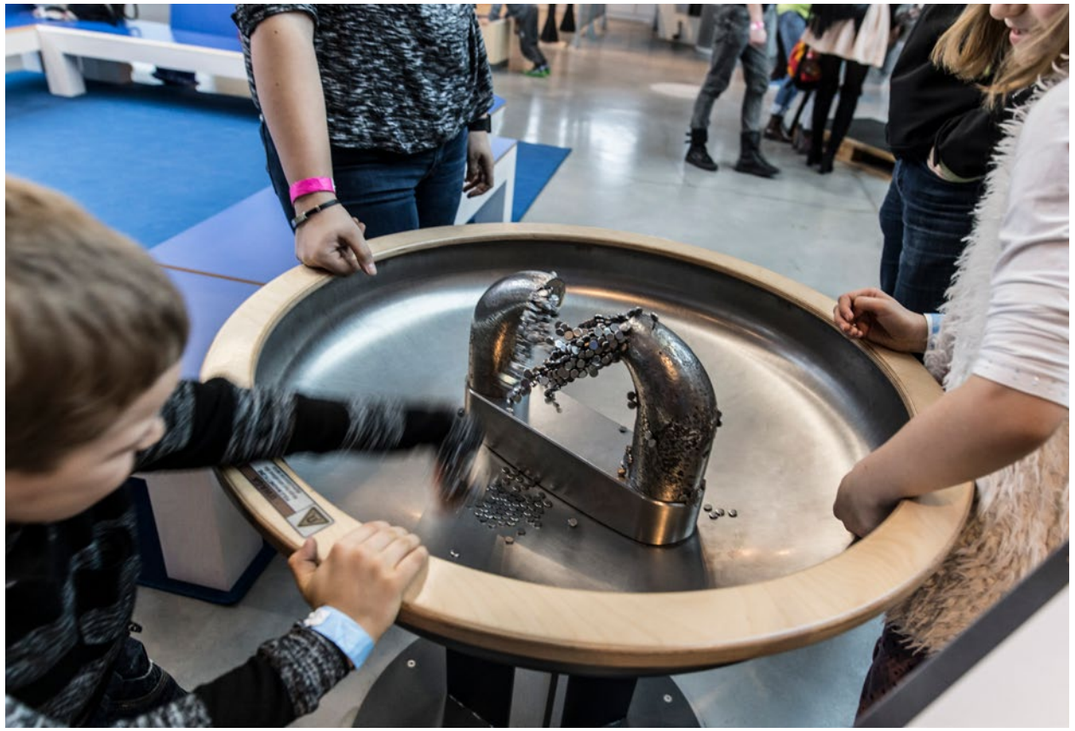
Opening the New World in Motion exhibition was the first milestone in the ongoing evolution of our exhibition galleries. Over the next few years, such changes will be implemented across the entire storey of the building, which until recently had been divided into three zones. Following the rearrangement, the whole upper storey of the Centre will form a single, visually and thematically coherent space, dedicated to humans and the natural world.

In 2016, we proudly launched 14 new exhibits at other exhibitions, all made at our own workshop.

The space dedicated to **temporary exhibitions**, expanded to cover **700 m^2**, allows us to present the finest displays imported from around the world. The exhibition **Mirrors** was open until 31 May. It featured 35 exhibits, co-designed by the British psychologist of perception Richard Gregory. On loan from Technorama in Switzerland, the temporary exhibition explained the principles by which reflections occur and how our eyes and brains perceive them.

We opened our latest temporary exhibition, on loan from the Czech science centre Techmania, on 18 August. Entitled **Sail or Sink** (open until October 2017), it **presents various aspects of humankind's interaction with water**, such as the pressure it exerts, how objects float, the mechanisms behind sea currents and whirlpools, activities such as diving and studying great ocean depths, and the operation of boats, ships and submarines. We have also integrated additional exhibits loaned by the Museum of Diving in Warsaw and the Museum of the City of Warsaw (including early-20th century architectural elements found in the Vistula River in 2015).

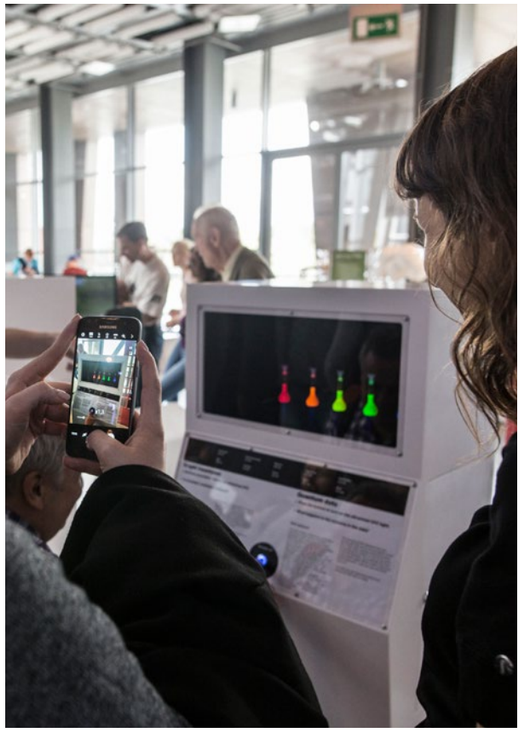
Both temporary exhibitions were accompanied by an extensive **educational programme**, featuring mini-workshops and science demonstrations for kids of all ages, experiment kits at the Thinkatorium, scenarios at our laboratories, Family Workshops, After Hours evenings for adults, and workshops for teachers combining exhibition topics with the core curriculum and preparing educators for visiting with their students.



It wouldn't be right to talk about the "New World in Motion" gallery without recalling **Remo Besio**, the late acclaimed expert in creating exhibits and experiment stations. He was the director of Technorama in Switzerland for many years, and following his retirement he continued to pursue his passion as an independent consultant working alongside his favourite science centres. We are incredibly lucky that the Copernicus Science Centre was one of them. He shared his experience when we were developing New World in Motion and motivated us to continue making improvements. Sadly, he passed away two weeks after the exhibition opened, and he wasn't able to attend the vernissage.

Several of the “New World in Motion” exhibits need to be operated in the dark. They have been placed in a special pavilion. We are also making sure our visitors are as comfortable as possible, and we have designated rest spots where they can sit down, have a chat and enjoy a small library.

Between 14 July and 11 September, visitors were able to attend the exhibition **Beyond the Lab: the DIY Science Revolution**. It revealed the stories of people who build their own medical devices to manage their diabetes, individuals monitoring air pollution, creators of portals sharing new inventions with patients, and patients themselves who are experts at managing their conditions. The numbers of DIY scientists who conduct experiments, invent and implement new ideas are growing rapidly. Equipped with cheap sensors and smartphone apps and with internet access they challenge our perception of who scientists really are and the shape of science in the future. The exhibition was one of the activities held as part of the European project SPARKS. More on p. 39.



In September, we opened an educational zone devised in collaboration with our long-term Strategic Partner Samsung. **Samsung Dot’s It** introduces visitors to the properties of nanotechnological objects (quantum dots) and their impact on the quality of everyday objects, including state-of-the-art televisions. More about our work with our sponsors on p. 43.

Two travelling exhibitions designed and built by Copernicus are currently touring Poland. **Captured Mind has so far visited 30 schools and cultural centres**, while the **Experiment Yourself!** exhibition has been to 38 venues. Late last year it was extensively revised and integrated into the **EducoBus** project implemented by the Polish Ministry of Science and Higher Education alongside the Copernicus Science Centre. The mobile exhibition travels to students living in the countryside, villages and small towns where access to attractive education formats can be limited. The first EducoBus arrived at the Community School Complex in Kozłów in December 2016. We are planning on visiting over a hundred schools across Poland in 2017.

Exhibition activities

Thinkatorium

In September, we celebrated the second birthday of the Thinkatorium – a workshop space filled with engineering, scientific and logical challenges. Visitors choose tasks from a wide selection and complete them without time limits. There are no instructions, so they have to rely on their inventiveness and patience. Such challenges encourage thinking outside the box, perseverance, determination and openness to new ideas. In 2016 we devised six new challenges. The Thinkatorium was involved in many of our programme activities, such as preparing topics for temporary exhibitions and workshops for teachers.

High Voltage Theatre

Here the starring role is played by electricity. Safely ensconced in a Faraday cage, the viewers experience impressive electromagnetic phenomena first hand. In 2016, we continued the popular performances **Electrons in Action**, **featuring spectacular electrical discharges and Duel of the Masters**, portraying **a clash of two ideas which changed the world** and the two great minds behind them, **Thomas Edison and Nikola Tesla**.

Robotic Theatre

Our RoboThespians are state-of-the-art robots using compressed air to move around the specially constructed stage. This year's repertoire included three plays: **Prince Ferrix and Princess Crystal** (based on Polish science-fiction writer Stanisław Lem's *Fables for Robots*), **The Secret of the Empty Drawer**, **or the Ghosts from the Fourth Dimension** (based on Edwin A. Abbott's 19th century novel *Flatland: A Romance of Many Dimensions*) and **What the Old Man Does is Always Right** (adapted from Hans Christian Andersen's classic fairytale).

Science demonstrations

During the week, visitors can watch 15-minute long science demonstrations in our exhibition spaces based on original scripts written by our explainers. One such presentation this year was **Sea Stories**, focusing on balance and sharing a thematic link with the temporary exhibition Sail or Sink. Our demonstration team also represented Copernicus at a science festival in Slovenia and during the Einstein Island event in Italy.

Mini-workshops

Mini-workshops are 20-minute presentations by our explainers. With small, ad-hoc groups, they conduct fascinating experiments providing more in-depth information on individual exhibits in a relaxed atmosphere. This year, many workshops were thematically linked to the temporary exhibition Sail or Sink. The participants discovered the principles of navigation and learned to tie knots, while youngsters checked which objects sink and which float.

From the youngest to the eldest

Family Workshops

These are weekend events for children and their parents. By conducting experiments, our young guests discover explanations of everyday phenomena while adults become their guides through the world of science. Why do stars shine? What happens to our trash? Why do ships float? What makes cakes rise? How do instruments make sound? The topics change every other month, and they are inspired by questions asked by kids. At the end of each workshop, parents are given educational materials so they can continue teaching and experimenting at home. In 2016, we hosted 196 Family Workshops with a total of 4,293 participants (2,255 adults and 2,038 kids).

Straight from the sky – lectures at the planetarium

In 2016 we continued the cycle of lectures at the planetarium accompanied by multimedia visualisations. During the eleven meetings, we hosted scientists from the European Space Agency, the Natural History Museum in New York, the National Centre for Scientific Research in Grenoble, the Institute of Geological Sciences of the Polish Academy of Sciences, the Astronomical Observatory of the University of Warsaw, the Institute of Astronomy of the University of Wrocław, the Janusz Gil Institute of Astronomy of the University of Zielona Góra, and the Faculty of Meteorology at the Poznań University of Life Sciences. The meetings were attended by 1,141 visitors.

Music at the planetarium

Why are nocturnes songs of the night? Why is Beethoven's most famous sonata named after moonlight? What are the links between the arts and music and astronomy? Our planetarium is increasingly popular with music fans of all ages. In 2016, we held 12 **Concerts for kids**, while adults could choose from a selection of contemporary and classical music (51 **Concerts under the stars**) and jazz (11 **Jazz orbits**). All concerts were accompanied by stellar light visualisations displayed on the planetarium dome. Fans of heavier sounds attended the highly acclaimed **Dark Side of the Moon** music and laser spectacle, paying homage to Pink Floyd, and **Voices in the Dark** which premiered in March.

After Hours events by Samsung

Once a month, Copernicus opens its doors after its usual closing time and welcomes all guests – as long as they are aged 18 or over. As well as opening up our exhibitions, laboratories and the planetarium, we host additional workshops, film screenings and meetings with experts. Each evening has its own title and leading theme. In 2016, we hosted nine After Hours events with a total of 9,110 participants.

Laboratories

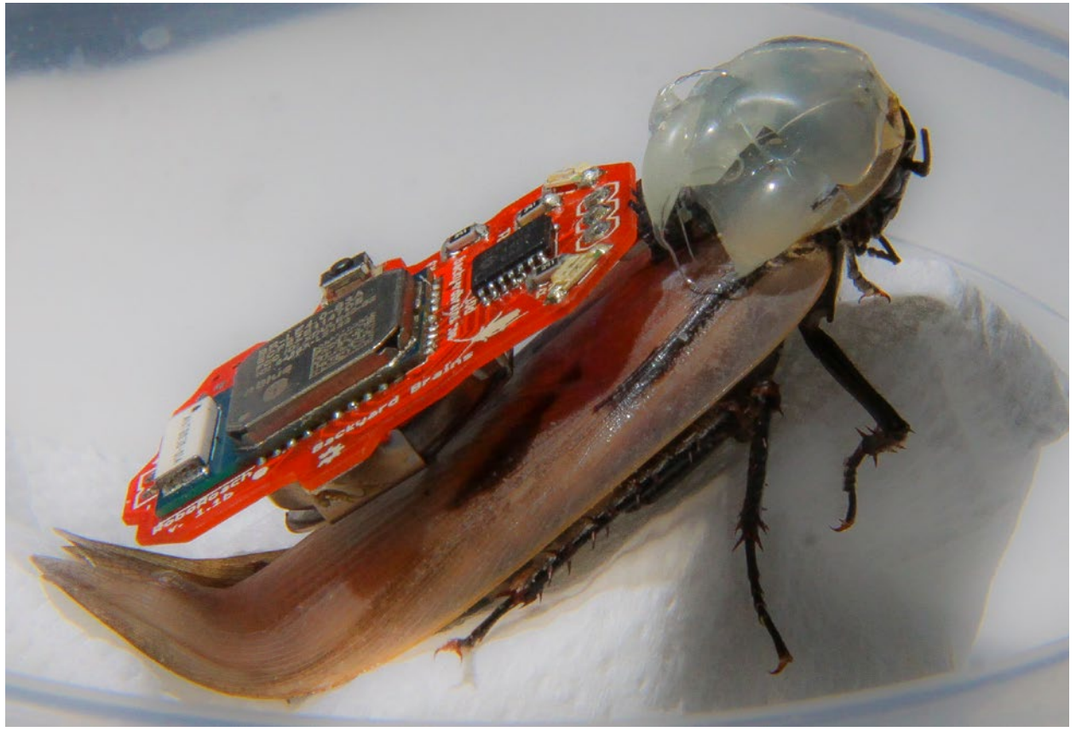
The labs are the R&D heart of our institution. We use them to test new formats of activities for students and teachers, to devise workshop scenarios and to prototype new exhibits. The laboratories have established their important role in the Copernicus organisational structure, being granted the status of a separate department in 2016.

The laboratories are using research methods on a greater scale than ever before. We have stepped away from giving instructions, and instead we are encouraging children to intervene in the course of experiments and design their own. We test a range of different activities; we seek inspiration from the "escape room" format and we are shifting focus from multimedia presentations to encouraging visual thinking. We also want activities for school groups to become a regular element of education, rather than being one-off visits. The laboratory section of our website www.kopernik.org.pl offers teaching materials. They are concepts of experiments which can be held during lessons before visiting Copernicus and information about the part of the curriculum addressed by specific laboratory activities. We are also planning to prepare suggested experiments to be carried out after visiting Copernicus.

Our laboratories have taken part in devising and testing concepts and developing and organising the majority of activities held at Copernicus, including the Science Picnic, After Hours for adults, Tesla Day, Summer in the Discovery Park, the Show and Tell conference, the Przemiany Festival, Museum Night and the pilot of the Schools Closer to Science programme. The Robotics Workshop has prepared special workshops celebrating Arduino Day, while the Chemistry Laboratory hosted a Valentine's Day event co-organised by one of our sponsors, BASF. The Samsung "Dot's It" educational zone (described in more detail on p. 15) is the result of a collaboration between our Physics Laboratory and our Strategic Partner. The Biology Laboratory has tested prototypes of exhibits such as a Winogradsky column, some of which have already been incorporated into our permanent exhibitions.

Our laboratories have represented the Copernicus Science Centre during numerous events. We took part in Biology Night (Faculty of Biology at the University of Warsaw), Robot Night (Industrial Research Institute for Automation and Measurements), Mobile Robot Tournament Robomaticon (Warsaw University of Technology), Brain Week (Nencki Institute of Experimental Biology) and the Optical Microscopy Summer School (Delta Optical).

The FabLearn Programme is implemented by Copernicus as part of a collaboration with the Transformative Learning Technologies Lab (TLTL) from Stanford University – one of the most innovative centres studying learning processes in the world. The idea behind FabLearn is rooted in the belief that children learn better when they are able to experiment, construct and build themselves (as part of a team) using the latest technologies. We are discovering the potential of this method and introducing state-of-the-art technologies to teaching processes. In 2016, we signed an agreement with the Bednarska Middle School. Students attended two pilot workshops developing sites for sparrows to nest in. The unusual bird boxes have been installed around the Copernicus building. The second FabLearn project involved high school students from the Bolesław Krzywousty School in Słupsk. The participants tried their hand at building a planetarium. They used PVC tubes to build a six-metre dome covered with an old parachute and shaded with foil. The star projector was made from an ordinary digital projector and a convex mirror. The planetarium is portable and easy to assemble and disassemble. It cost 1,500 zlotys and took around three weeks to make. The students unveiled their planetarium at Copernicus during the International Planetary Society (IPS) conference in June (more about the event on p. 23). The project was extremely well received, and the students were invited by representatives of Stanford University to attend the FabLearn conference dedicated to the latest tools and methods used in education. The students hosted a workshop and together with the participants they built another planetarium of their own design.



Chemistry Laboratory:

3 new lesson plans
3547 students on school trips
5113 individual visitors

Biology Laboratory:

3 new lesson plans
3505 students on school trips
4219 individual visitors

Physics Laboratory:

3 new lesson plans
3510 students on school trips
4942 individual visitors

Robotics Workshop:

3 new lesson plans
1636 students on school trops
4079 individual visitors

The finale of the four-year project **SYNENERGENE** – Responsible Research and Innovation (RRI) in Synthetic Biology – was held last year. Its aim was to facilitate discussion on synthetic biology – a new, fast-developing discipline focusing on designing and creating synthetic biological systems. They may be based on naturally occurring systems or built from the very basics using state-of-the-art tools such as genetic engineering. The Biology Laboratory and the "GENESIS" Synthetic Biology Science Club at the University of Warsaw held five synthetic biology workshops during the Przemiany Festival. The collaboration between Copernicus and the iGEM Team Warsaw has resulted in the publication "Genes and Machines".

New at the planetarium

Chin up! Astronomical observations

Transit of Mercury

On 9 May, we invited astronomy fans to join us to observe the phenomenon of Earth, Mercury and the Sun aligning. Participants followed Mercury's transit in front of the Sun on the screen, looked through a telescope and took part in a meeting with special guests. Observations of this rare event were an excellent opportunity to present a fascinating lecture about our Solar System to attending school groups. The event was attended by 1000 people.

Night of the shooting stars

It's become something of a tradition. During the early hours of 13 August, thousands of people once again gathered in our Discovery Park and the nearby Vistula Boulevards to observe the Perseids – one of the best known showers of meteors, often called shooting stars. We strive to improve the conditions for conducting observations in the city by switching off all illuminations at the Copernicus Science Centre, the Planetarium and the Discovery Park. But that's not all! The city roadway authority dimmed nearby bridges and squares, and our neighbours from across the river – the PGE National Stadium – also joined in. The event was attended by three thousand people, despite poor weather conditions. People who weren't able to join us could watch events unfold live through an online webcast.

Premieres of 2016:

Films: Dark Universe

Seasonal demonstrations held live before screenings: Planetary Journeys, Antipodean Skies, Supermoon Nights, Winter is Coming

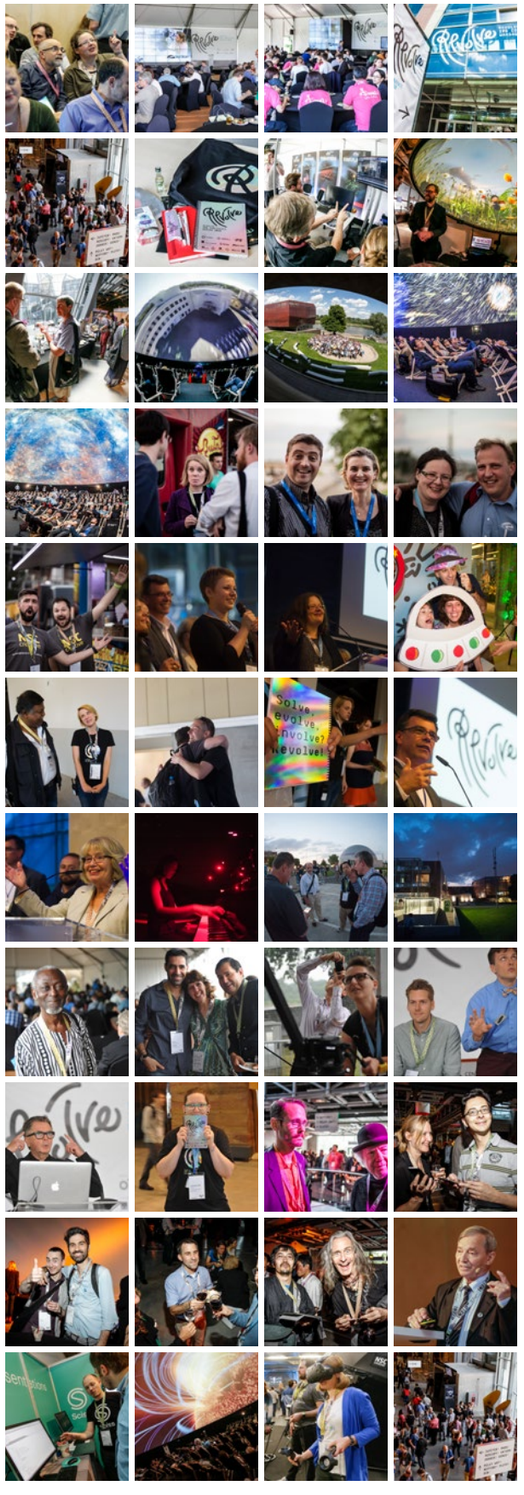
Special shows: The Book of One Thousand and One Stars (Valentine's day screening)

Laser displays: Voices in the Dark (more on p. 18)

Demonstrations held during each After Hours session

In 2016, the Planetarium revealed a brand-new website. It's more intuitive and easier to navigate, and there is an option of online bookings. *www.niebokopernika.pl*

The production studio of Heavens of Copernicus is finalising its latest film. Work is expected to finish in spring this year. The studio's first film, "Dream to Fly", is a huge success at fulldome festivals and on the planetarium market. It is currently being shown at dozens of planetariums around the globe.



"Revolve" IPS Conference, Warsaw 2016

We spent the last three years preparing for this conference. We were honoured to be selected by the International Planetarium Society (IPS) as hosts of the group's annual meeting. The world's largest and most prestigious meeting of the astronomy industry was held between 19 and 23 July, coinciding with the fifth anniversary of Heavens of Copernicus. The conference's leading theme was "Revolve" and this dynamic concept extended throughout the programme: 85 sessions, 40 trade stands, five digital projection systems, three star projectors made by leading manufacturers, and four evening events. The sessions were divided into thematic blocks which included subjects key in the planetarium's everyday activities as well as long-term projects. Throughout the conference, the Discovery Park hosted two domes used for presentations and discussion panels. We also prepared a Dome Village with eleven domes presenting planetarium equipment and hosting displays and workshops. The conference was attended by over 500 participants from 50 countries, who agreed that it was the most interesting and best organised conference in the society's longstanding tradition. The programme, detailed information and photos can be found at *www.ips2016.org*

Educational events

Copernicus Science Centre exhibitions in education

A well-prepared school trip makes all the difference, yet preparations pose a major challenge for teachers. We support them by hosting **Teachers' Afternoons with Copernicus**. During the meetings educators get to know the Copernicus space, exhibitions and current events, with a particular focus on the newly revamped permanent exhibition gallery New World in Motion. In 2016 we hosted 14 meetings with the participation of 217 visitors.

To make the most of the educational potential of our displays, we encourage teachers to take part in **workshops among the exhibitions**. This requires them to spend more time on the specific aspects of the exhibitions to find the best ways of linking them to the subjects they teach. In 2016, we hosted five workshops during the temporary exhibition Mirrors (with 80 participants) and six during the Sail or Sink exhibition (with 68 participants).

Educational kits

Educational kits prepared by Copernicus, usually in conjunction with our partners, support teaching at different levels. They contain materials and equipment required to conduct fascinating experiments.

In 2016 we continued working with the power company RWE (now Innogy). **RWE PowerBox** is a tailored educational kit on generating and using energy. The kit can be used to build a miniature solar or wind power station, or solar-powered cars. We held five workshops on the PowerBox kit with the participation of 100 teachers.

Together with Boeing we have prepared our latest kit, **Constructors of Dreams**, supporting science, technology, engineering and mathematics (STEM) subjects. Designed especially for Young Explorer Clubs, it contains materials and equipment for students to solve problems and challenges improving their understanding of the properties of air. This puts students in the position of engineers, who define their tasks and work as a team to find solutions. During their experiment, young scientists document their research, analyse their work and seek answers to questions. An important element of the project is exchanging experience between clubs and the evaluation of the learning process. Club members can suggest improvements to the kits, while teams participating in competitions can obtain funding for their projects.

Events hosted with partners

Between 8 and 10 April, our Conference Centre hosted the fourth **Young Researchers Festival DISCOVERY**. It featured the finals of two student competitions: the Polish part of the 28th Contest For Young Scientists (EUCYS 2016) hosted by the Polish Children's Fund supporting talented students, and Physical Paths organised by the PAS National Centre for Nuclear Research. The festival was attended by organizers of Young Explorer Clubs, which engage in research projects frequently alongside professional scientists.

The **Summer Seminar of WARS and SAWA** is a regular event co-organised for the sixth time with the Warsaw Centre for Socio-Educational Innovation and Training. This year's theme, "What and how we learn at science centres", focused on the research into learning processes conducted at Copernicus. We looked for answers to questions on the educational dimension of visiting science centres and how those visits shape children's interests and attitude to science. The seminar's special guest was Prof. Grzegorz Karwasz, lecturer at the Nicolaus Copernicus University in Toruń, who talked about how the educational strategies adopted by science centres and museums support learning, and the cognitive functions which can be developed through traditional and interactive exhibitions. The meeting, held on 7 June, hosted over 80 teachers from Warsaw.

Show and Tell Conference

For the last ten years we have been assessing the need to shape, plan and organise modern education processes. We have built up a wide circle of people who not only want to change education for the better but are already doing so. The Show and Tell Conference has become our key educational event. By hosting teachers, educators, scientists and representatives of businesses, local authorities and NGOs, Copernicus is fostering an environment supporting bold dialogue on the challenges faced by contemporary education. This year's event, held at the Copernicus Science Centre on 26 and 27 August, followed Richard Feynman's idea that "Science teaches the value of rational thought as well as the importance of freedom of thought". The main motto of the conference was **Education closer to science**.

Scientists are faced with the unknown every day, but they know how to deal with it: they ask questions, pose hypotheses, conduct tests, make mistakes, draw conclusions and always strive to improve. These skills are all essential in the modern world, and by getting closer to science, education can only benefit. By learning about the world with passion and courage, students have the opportunity to be creative and critical – just like scientists devote themselves to studying reality. They also learn to seek solutions themselves, which prepares them for challenges of adult life. Contemporary education must respond to change, and in an ideal world it should precede and outline it. The future belongs to creative, courageous and reliable people, rather than those who only follow instructions and orders. So how can those skills be honed?

The inauguration featured a lecture by **Matteo Merzagora**, director of the Escpaces des Sciences Pierre-Gilles de Gennes in France. **Dr. Ilona Iłowiecka-Tańska**, director of the Research Department at the Copernicus Science Centre, discussed scientific capital and things which shape young's people attitudes to science, while **Prof. Janusz Mucha**, sociologist from the AGH University of Science and Technology in Kraków, talked about social links between science and culture. During workshop sessions and discussion panels, which form an integral part of the conference, participants learned why we tend to categorise minds as scientific or artistic, and whether such thinking limits our options and horizons. They addressed the question of how teachers can make the most of scientific achievements and develop their own research skills. Do schools provide a space for mistakes and disappointments and using them to draw conclusions? We also considered the differences between innovation and fashion in pedagogy, and tested new discussion formats: Living Libraries and Science Espresso. The event, held on 26 and 27 August, was attended by 230 participants.

It was followed by the third **post-conference publication**, featuring short interviews with individuals with close ties to the conference and commemorating the tenth anniversary event. The document can be downloaded from *www.kopernik.org.pl* under the tab "Teachers".

Young Explorer Club programme

The Young Explorer Club programme, one of the key activities of the Copernicus Science Centre, forms a part of our long-term development strategy. It is focused around creating club networks, forming regional hubs, supporting local partners in Poland and abroad, working with academic centres, initiating inter-club projects and supporting the professional development of club leaders.

YEC at Copernicus

Inaugurated in 2016, the YEC development model is centred around identifying and engaging the most active club leaders. Their skills and attitudes form a key part of the bottom-up development of the programme and are an important element supporting the network. Meetings at the Copernicus Science Centre aim to improve the skills of YEC leaders and encourage involvement in new activities. The first YEC gathering was held at the Centre on 9 and 10 April during the Young Researchers Festival DISCOVERY (more on p. 24). It was attended by 16 of the most active club leaders. The second meeting (for 18 leaders) was held on 24 and 26 August, just before the 10th Show and Tell Conference, allowing YEC programme leaders to take part in the anniversary conference – a key event in the Copernicus educational activities calendar. It's worth noting that YEC leaders comprised almost a third of the 200 participants in the Show and Tell Conference.

5th YEC FORUM

Held annually, the Forum is the most important event in the YEC programme and a perfect opportunity to bring together educators, scientists and representatives of educational institutions and organisations. This year's Forum was dedicated to the social role played by the clubs – after all, as well as being an educational programme, YEC is also a social movement bringing together the most engaged teachers. The programme's social side is revealed through the relationships built by the clubs and by joint activities. The meeting, held on 18 and 19 November, was attended by 220 club leaders from Poland and abroad.

YEC partners in Poland and abroad

Since its inception, the YEC programme has been supported by the Polish-American Freedom Foundation, which is currently the programme's partner. Our regional partners (the ExploRes Association in Rzeszów supported by the University of Rzeszów, the Teacher Training Centre in Olsztyn and the Ilia State University in Tbilisi) were joined by the National Children's Fund and the Vyatautas Magnus University in Kaunas. In 2016, we also initiated a collaboration with Boeing, which has resulted in the creation of the educational kit Constructors of Dreams, aimed at the most active clubs. More about Constructors of Dreams on p. 24.

781 clubs around the world

645 clubs in Poland (including 320 founded this year)

100 clubs in Georgia

19 clubs in Ukraine

10 clubs in Belarus

7 clubs in Lithuania

The YEC stand at this year's Science Picnic, run by club members from Poland, Georgia, Belarus and Ukraine, was located at the Copernicus Science Centre tent next to the VIP area. It was one of the most popular stands, and it was visited by special guests from the Ministry of Education, Ministry of Science and Higher Education and authorities of the Capital City of Warsaw.

European Science Education Resource Office (ESERO) – Poland

ESERO is the educational arm of the European Space Agency (ESA), with the Copernicus Science Centre coordinating the project in Poland. It supports the teaching of STEM subjects by presenting them in the context of space research. The project aims to inspire young people to choose careers in engineering and technology. ESERO-Polska hosts a range of practical workshops for teachers, international competitions and meetings with scientists, as well as providing film materials, event scenarios and software.

Workshops

On 22 October, we held the third all-day workshop **Space research at schools**. Participants could join workshops and attend lectures on space missions. We prepared teachers to support teams taking part in the European Astro Pi Challenge. The Remote Mars Yard project allowed participants to take on roles of space agency experts remotely operating rovers such as Curiosity. The remaining participants designed and launched compressed air rockets and learned how scientists search for evidence of microorganisms in space.

Meetings

For the first time ever, Polish teachers and students were able to connect live to an **astronaut currently on board the International Space Station**! On 14 April, the videoconference with Team Peak was attended by three groups of teachers and students from Europe and journalists from the US. The teachers asked him questions on his experiments, career path, work on the space station and general interests. On 8 December, we hosted a meeting with **Antonio de Luca**, space engineer from ESA, who talked about the ins-and-outs of building satellites, rockets and rovers. After the meeting, participants visited the exhibition **Look! There's Earth** at our planetarium.

Competitions

All you need to make your own satellite is an empty drink can, a microprocessor, an aerial and a little parachute. Any other kit in the can depends on the constructor's inventiveness and the kind of research they want to conduct. Minisatellites were made by middle and high school students as part of the Polish instalment of the international **European CanSat** competition. The finals were held near Sandomierz between 7 and 10 April. The winning team from Toruń represented Poland at the international finals in Portugal. The Polish ESERO CanSat competition was supported by Boeing.

As part of the **Remote Mars Yard** competition, held in Poland for the first time, middle and high school students took on roles of space agency experts. Their aim was to simulate a landing on Mars. Once they were on the surface of the Red Planet, they studied a crater by remotely steering a specially designed rover. The competition, co-organised by ABM Space Education, attracted 25 teams from across Poland. The finals and award ceremony were held on 17 December at the Heavens of Copernicus planetarium.

Copernican Revolution

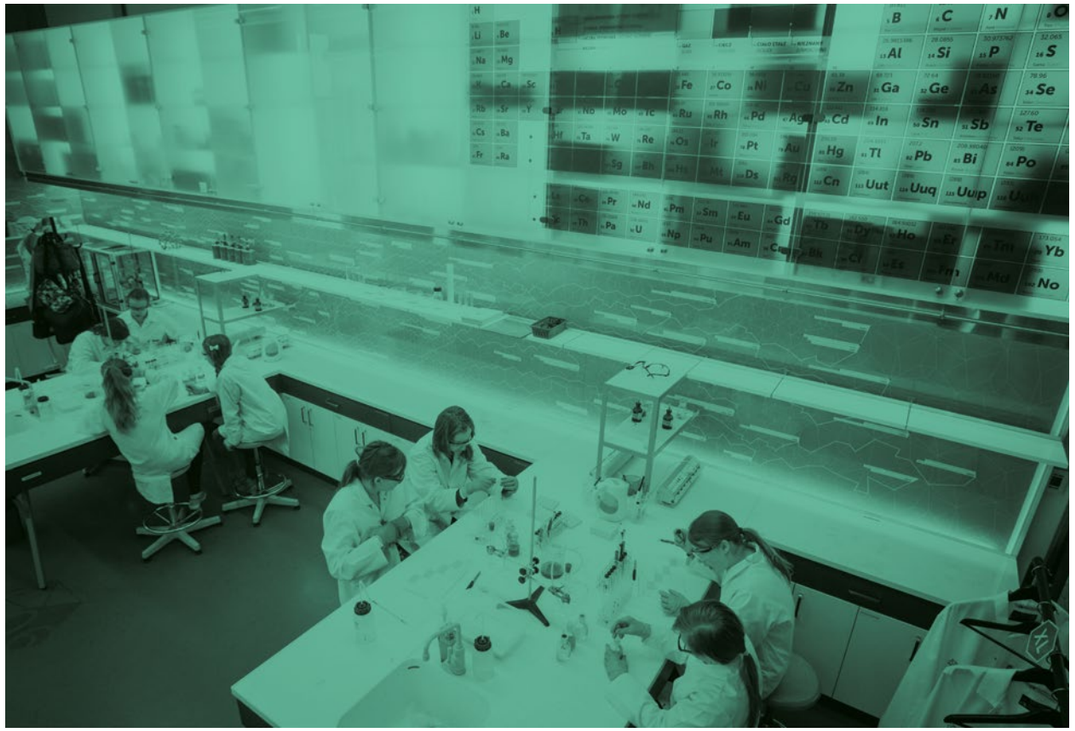
One part of the ongoing development of the Copernicus Science Centre has involved the creation of an interdisciplinary research and development centre. The Copernican Revolution workshop is slated to conduct research in the field of learning studies in order to design and prototype innovative educational materials.

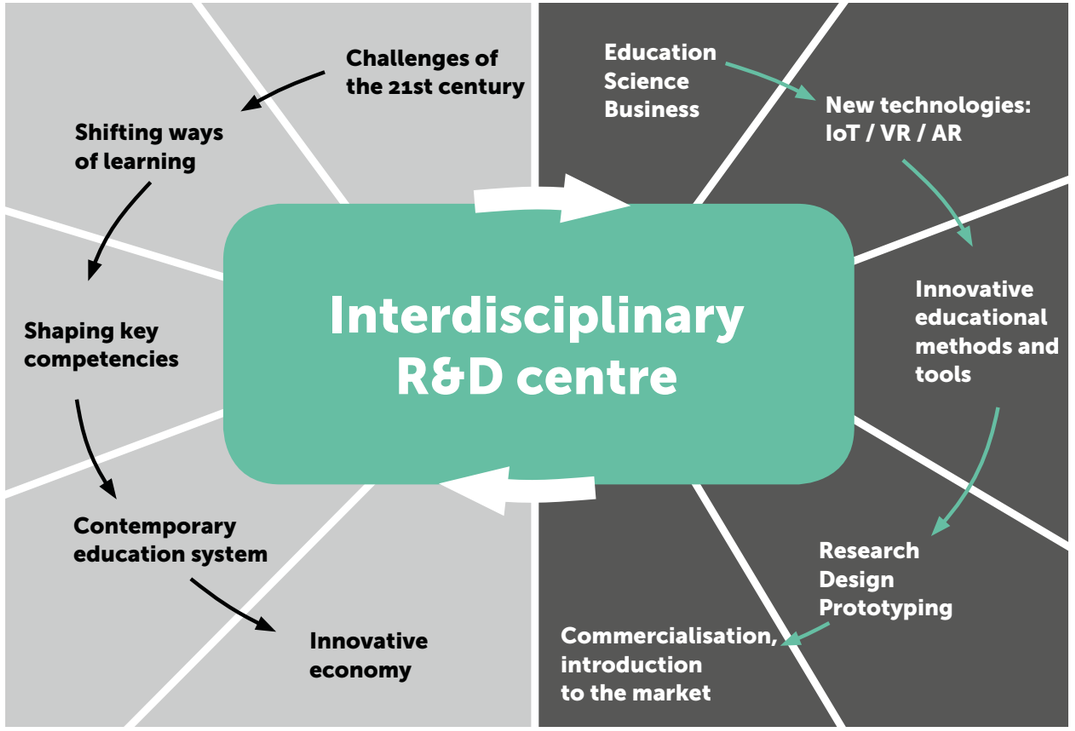
The planned activities of the Copernican Revolution workshop involve state-of-the-art practices, information on the latest R&D trends in education, and addressing the needs of the shifting employment market and knowledge-based economy. The laboratory will be a space for interdisciplinary and cross-sector collaboration of partners from the worlds of science, education, business and social initiatives. The results will support changes being implemented to the education system in Poland by providing reliable, innovative and highly applicable solutions.

The Copernican Revolution workshop will conduct interdisciplinary educational activities using state-of-the-art technologies. The research will cover cognitive effort, mechanisms of creating meaning and decisions to explore in a range of social groups and individuals. The results will be used to design methods, tools, recommendations and educational standards to be disseminated and commercialised by the public sector. The research will be conducted on volunteers participating in the studies and testing the educational products and services under development. We will also study how these products and services impact learning processes.

Consortium aims:

- To create complementary, standardised research tools for diagnosing the level of actual accessibility of educational products to learners with different social and psychological characteristics
- To work in interdisciplinary research teams to develop a better understanding of learning processes on the basis of state-of-the-art research methodologies and techniques
- To develop innovative educational products which make the most of the potential of new technologies and improve their availability through commercialisation
- To develop innovative educational methods (e.g. workshops) and expand their scope to reach a wide range of recipients (e.g. children, young adults, adults)
- To expand the activities and improve income from R&D activities through commercialisation





20th Science Picnic of Polish Radio and the Copernicus Science Centre

"Twenty years ago, at the Rynek Nowego Miasta square in Warsaw's historic district, a journalist asked a smartly-dressed primary school pupil and participant in the 1st Polish Radio Bis Science Picnic, "Are you enjoying all the displays?" The girl answered, "Yes!" and when asked why, she gave the unforgettable answer, "Because everything is so fascinating here, even though it's so boring at school."

Ever since, during every Picnic, I appeal through journalists for this now grown-up lady to get in touch with me. Perhaps she has children of her own, attending kindergarten or school. Perhaps she is a teacher or scientist, or maybe she's a lawyer or runs a boutique. I would like to ask her whether she still thinks that science is interesting.

Over twenty years ago, I arrived at the office of Krystyna Kępska-Michalska, director of the now-defunct Polish Radio Bis – an institution that will be remembered for many commendable contributions to furthering Polish science and culture). I talked to her and her deputy, Robert Firmhofer, about taking a step towards the future to take science, often discussed on the waves of Radio Bis, to the streets and show it to all citizens. I didn't have to try hard to convince them. A few months later, late in the evening in the pouring rain, the three of us stood on a stage in front of the former "Wars" cinema trying to explain to Varsovians that it's over, that we're packing up our stands with the world's most fascinating product – science – but only for a short while. And that the following year we'll be back and the stands will be even better and more interesting. And we were. And here we still are!

In the meantime Poland has been undergoing and continues to undergo dramatic political and social changes, Polish Radio continues to evolve, the Copernicus Science Centre has been created (it's worth noting that probably wouldn't have happened had it not been for the Science Picnics, since the Copernicus team has largely grown out of those experiences)... But the Picnic is still here – every year crowds gather for Europe's largest outdoor event popularising science, which has become a template for many similar, much smaller science picnics hosted in dozens of cities in Poland and abroad.

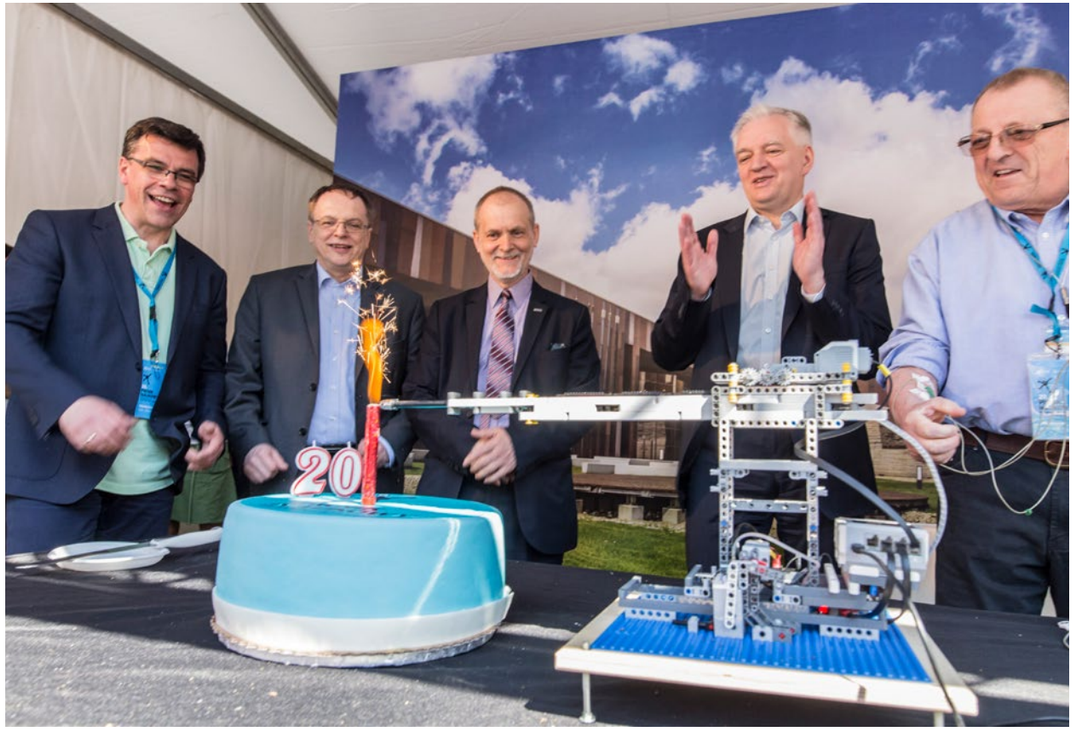
Almost at the same time as the Picnic, in autumn 20 years ago, Warsaw hosted Poland's first Science Festival. This lower-key event has also evolved over the years, and it played an important role in the foundation of Copernicus.

This time we are creating a huge family of people whose aim to is to make the dreams of that young girl from the first Picnic come true: for science taught at schools to be more interesting than the latest Facebook gossip, and for school experiments to be unforgettable.

Over the last two decades, the Picnic has persevered thanks to the determination of its organisers – a small but dogged group of Polish Radio employees, scientists, journalists and Copernicus team members. We all survived many winds and storms, frequently arriving from unexpected directions. After the twenty years, as I approach my own horizon, I don't quite know how to express my gratitude, appreciation and friendship. I think you know how much you all mean to me. I am sad that many of the organisers of the 1st Picnic are no longer with us, but they are always in my thoughts.

I would like to extend my thanks to all directors of Polish Radio we've had the pleasure to work with over the years. Even when sometimes the discussions didn't proceed as we'd hoped, I take full responsibility and hope that we can continue working well together. I would also like to thank the Warsaw city authorities without whom such a major undertaking, organised by a common movement of scientific circles twenty years ago, would never have survived.

Thank you, also, to the Polish government which has helped us find a space at the National Stadium, and the Stadium authorities for being so supportive of our authorities. And thank you to all of Warsaw's technical organisations, the police force, the municipal guards, the fire brigade and the ambulance service for supporting us over the years.



Most of all, I would like to extend my most heartfelt thanks to all those who have attended the Picnic over the years – all two million of you. It is thanks to you and for you that we continue.

Let the Force (of Science) be with you!

Prof. Łukasz A. Turski
Chairman of the Programme Board of the Copernicus Science Centre

Close to 900 demonstrations by 212 institutions, numerous competitions and experiments focusing on healthcare – the main topic covered at this year's Picnic. On 7 May, almost 70,000 visited the event at the PGE National Stadium.

Przemiany Festival

How will you celebrate your 120th birthday? It's a question worth pondering, since statistically speaking we are all living longer – and ageing populations are a growing social problem. But will the price to pay for having the chance to blow out so many candles be too high? Where lie the limits to our drive to prolong life? Will technology allow us to achieve digital immortality? Responsible consideration of these problems requires us to reflect on many different scenarios. As every year, the Przemiany Festival has launched a debate on the future of society and the effect of new technologies.

This year, by setting our rational minds to ponder the temptation of immortality (the festival motto), we considered questions such as the patient-participation model of healthcare and innovations in the medical sector. We explored longevity in terms of developments in genetics and molecular biology, as well as from the perspective of ageing populations, which teach us that long life is affected by factors such as stress, diet and family and social ties. Is quantity more important than quality? What are the social consequences of extending our lifespans? Are we under threat of overpopulation and the subsequent depletion of resources and destruction of natural ecosystems?

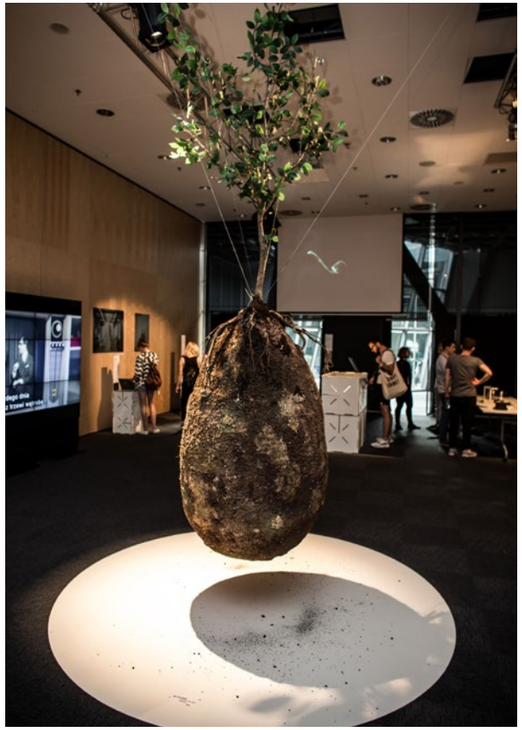
The four days of the festival were filled with a busy programme: exhibition of "art & science" and "critical design" projects, accompanying discussion panels, and an experimental debate with audience participation. We also hosted a wide range of workshops, from practical classes at the biology laboratory to transdisciplinary meetings for scientists, designers and marketers. In-depth discussions on mortality and the impact of science and state-of-the-art technologies on our lives were accompanied by film screenings and a theatre performance. As usual, there was an electronic music concert Przemiany Live! and a Breakfast by the Vistula. This year we also broke all attendance records, with around 8,700 people attending the event held between 1 and 4 September.

The **Festival Exhibition** aimed to provide an insight into longevity and the myths and dreams of immortality, widespread in popular culture. By analysing our current understanding, it posed questions on the limits of our age in the biological and ethical contexts.

The "critical design" and "art & science" projects speculated on the future of medicine and the role played by elderly people in family life and local communities.

The exhibition featured works by Ann-Kristin Abel, Murray Ballard, Drew Berry, Arjan Brentjes, Raoul Bretzel, Michael Burton, Anna Citelli, Amy Congdon, Rafał Dominik, Goliath Dyevre, Agi Haines, Bart Hess, Małgorzata Gurowska, Jenny Lee, Susana Camara Leret, Stanisław Łoboziak, Michiko Nitta, Marilene Olivier, Olga Matras, Aleksandra Mierzwa, Wiesław L. Nowiński, Jaemin Paik, Pani Jurek, PLEIX, Mikę Thompson, Ouentin Vaulot, Danny Warner and Karolina Żyniewicz, as well as BLUE ZONES®, the Biology Laboratory at Copernicus, the Biomedical Equipment Science Club at the Warsaw Institute of Technology, World of VR, and Alzheimer's Research UK.

The exhibition partners were the British Council, the Nencki Institute of Experimental Biology, and Cortland.



Capsula Mundi by the Italian designers Anna Citelli and Raoul Bretzel was displayed at the **Temptation of Immortality** exhibition accompanying the festival. The work is meant to illustrate the concept of bio-burials, whereby instead of wooden coffins the dead are placed in egg-like capsules made of biodegradable materials, and a tree of their choosing is planted on top. Current regulations do not allow for such such practice, but perhaps one day stone headstones will be indeed replaced by forests?

In the early 1950s, an African-American woman named Henrietta Lacks died soon after being diagnosed with cervical cancer. Unknown to her family, a doctor collected a cell sample from the tumour; the cell line continues to grow until the present day under the name HeLa and it has contributed to many breakthrough discoveries over the years. On one hand, a human drama, while on the other a huge medical success... The play **Henrietta Lacks** posed questions on the boundaries of science, the nature of experiments on human cells and on the rights we have as humans with regard to our own bodies.
The play was co-produced by the Nowy Theatre in Warsaw, partner of the Oncocafe Foundation.
It starred Marta Malikowska, Sonia Roszczuk, Maciej Pesta and Jan Sobolewski under the direction of Anna Smolar, winner of the Paszport Polityki award in 2016.

Summer in the Discovery Park

Every year, the green area surrounding Copernicus is transformed into a space for creativity. This time, during the nine weekends of the summer holidays the Discovery Park hosted adventures in the style of Robinson Crusoe under the banner “Art of Survival”. Families flocked to the park to test if they had the skills needed to survive beyond the urban comfort zone.

Participants in outdoor workshops tried their hand at starting a fire using flint, sewing shoes and forecasting weather; they also learned about edible insects and built solar cookers. They recorded their new skills in survival-course diaries (such as that shown to the right). And there was plenty to strive for! After all, not everyone can boast badges confirming their skills in stargazing, shoemaking, fire-making or divining the weather. There were also outdoor games and football, boules and badminton tournaments, as well as tours around the Copernicus roof garden where guests learned about plants which thrive in sparse urban conditions. The outdoor workshops were partnered with Planete+. Throughout the summer, we received over 6,880 visitors.

Summer Cinema once again brought film screenings every Friday evening during the summer. We showed ambitious independent films and fascinating documentaries on a big screen under open skies. Every year, the leading theme focuses around an important social issue, and each screening is preceded by a discussion with experts. This year’s motto “Art of Survival” meant we were reflecting on the challenges faced by our species. What happens when culture and language disappear? What were the circumstances and characteristics which helped homo sapiens thrive, spread all over the globe and develop civilisation? The partners of Summer Cinema were Planete+ and Filmowa Stolica Lata. The screenings were attended by a total of 3,380 guests.

Other events

Love is chemistry

This was the motto of many events held at Copernicus in February. As an alternative to the ubiquitous red hearts, chocolates and flowers, we hosted science-themed dates. Visitors followed a specially devised path, and the Chemistry Laboratory joined forces with BASF to prepare Valentine's Day-themed workshops.

Is sugar invigorating? Diabetology weekend

On 21 and 22 May, we invited guests to join us in activities promoting the understanding of diabetes and the pre-diabetic state. The event was partnered with our sponsor Polpharma. We demonstrated basic physical experiments involving sugars, explained the construction of glucometers and let visitors test their own sugar levels. We assessed over 350 people, finding a few cases qualifying for more specialist diagnostic tests and potential treatment.

Fame Lab

For the fifth time, we co-organised (alongside the British Council) Poland's instalment of FameLab – one of the leading competitions in science communication. Scientists participating in FameLab face a jury and the public to talk about a subject they personally find fascinating. They get three minutes to present their case on the stage.
Over the years, the competition has received close to 400 entrants, and many FameLabbers have gone on to become popularisers of science while remaining active in their research. In 2016, the first prize was awarded to Karolina Nowak – doctor at the Bielany hospital in Warsaw and PhD student at the Faculty of Endocrinology at the Medical Centre of Postgraduate Education and the PAS Institute of Fundamental Technological Research.

Tesla Day

Together with our visitors, we celebrated Nikola Tesla's birthday on 9 July. Copernicus prepared many additional attractions including special displays at the High Voltage Theatre, classes at laboratories and workshops for our youngest guests. The event was partnered with RWE (now Innogy).

Other events we took part in:

First International Science Centre and Museum Day

The second SPiN Day campaign (more on SPiN on p. 40) was combined with UNESCO's International Science Centre and Museum Day (10 November). The event was held throughout Poland, with 34 SPiN institutions hosting science displays, workshops, lectures and other activities.

Copernicus welcomed representatives of the Faculty of Physics at the University of Warsaw, the PAS Institute of Physical Chemistry, five Young Explorer Clubs and two institutions from the SPiN Agreement: the Leonardo da Vinci science centre from Chęciny and the Humanitarium from Wrocław.

20th Science Festival

We have been participating in Warsaw's celebrations of science since 2007. Between 26 and 29 September, Copernicus hosted festival lessons at the laboratories and the planetarium and presented a scientific display under the dome. We also took our Family Workshops to the Young People's Science Festival at the Faculty of Physics at the University of Warsaw.

Museum Night

During Museum Night (in the early hours of 15 May), we hosted 5,687 visitors.

Winter and Summer in the City campaigns

The total of 3400 vouchers were distributed to children from all of Warsaw's districts by the Office of Education of the City of Warsaw – coordinators of the campaign.

Citizens in Medicine

Copernicus hosted several events as part of the Europe-wide SPARKS project, under the banner Citizens in Medicine. It aims to foster dialogue between citizens, scientists and doctors and raise awareness of responsible research and innovation (RRI). SPARKS is held in 27 countries across Europe, and it's financed through the Horizon 2020 programme.

A **Reversed Science Café** is a discussion format we have devised and tested so that it can be used in other countries p articipating in SPARKS. We flipped traditional roles of participation, with experts asking café visitors questions and opinions. The discussion focused around technological progress in medicine and healthcare. The event (21 April) attracted 20 participants and nine experts working in medicine, ethics, new technologies, research into learning processes, informal education and open data. The starting point of the discussion was research being conducted by Dr. Paweł Szczęsny (winner of a prize awarded by the *Polityka* weekly) into the prevention of sudden infant death syndrome through early detection of symptoms using simple and cheap electronics.

The Reversed Science Café format has been successfully applied in other EU countries, and it has been featured in a brochure published by ECSITE describing best practice in RRI. SPARKS itself has been described as a success story of the *Science with and for Society* project of the Horizon 2020 EU Framework Programme.

The **Citizens in Medicine exhibition** presented stories of seven people who have taken their health into their own hands as patients and engaged citizens. The exhibition was hosted at Copernicus between 14 July and 11 September. It featured seven **Science Espresso** sessions – mini-meetings with scientists. More about the exhibition on p. 14.

We also held **workshops** during the Przemiany Festival (2 September). They brought together experts in various fields, including researchers, healthcare workers and representatives of governmental institutions. The main discussion topic was access to medical data. The workshops served as a platform for making contact and taking first steps towards improving the existing system.

The **Hackathon** (26 November) organised by Copernicus and the Medical University in Warsaw brought together dozens of engineers, designers, medical students, materials scientists, makers and doctors. The team led by Prof. Mirosław Wielgoś and Dr. Przemysław Kosiński from the Medical University in Warsaw set the participants a fascinating challenge. Doctors are working on ways of saving children suffering from congenital diaphragmatic hernia. One method is foetoscopic tracheal occlusion, during which a balloon filled with saline is placed in the trachea while the baby is still in the mother's uterus. The balloon needs to be removed shortly before birth, but this procedure can only be carried out by highly trained gynaecologists at major hospitals. Is it possible to devise a method for removing the balloon in non-specialist hospitals, or come up with an alternative, simpler solution?

Four teams worked for ten hours on their projects. The jury selected two which stand a real chance of saving lives, and the ideas are currently undergoing further tests. The Warsaw University of Technology is working on a prototype while the Medical University in Warsaw is seeking international partners. The Copernicus hackathon was Poland's first meeting of experts from so many fields joining forces to develop solutions to a real medical problem.

Local and international partners

As an institution, we are deeply rooted in the local community, responding to its needs and making the most of its resources. At the same time, Copernicus is a brand widely recognised the world over, valued as a partner, a source of inspiration and an important member of international organisations.

Scientists from the Copernicus Science Centre conduct research in **partnership with scientific institutions**. The agreements we signed in 2015 with the **University of Social Sciences and Humanities**, the **University of Special Education** and **Stanford University** have now taken on a practical dimension (more about Science Live on p. 8 and the FabLab programme on p. 20). Results of our research, disseminated through conferences and publications, are contributing to increasing levels of scientific understanding. In 2017 we are aiming to host the second academic conference **Cognitive Adventures**; following last year's event, we struck up fruitful collaborative ties with **Kings College London**.

Since its inception, Copernicus has been a member of the European Network of Science Centres and Museums **ECSITE** (our director Robert Firmhofer served as its president for many year) and has had active collaborations with several institutions from the network. Our representatives sit on the **ECSITE Programme Committee** and the **Editorial Committee of the ECSITE journal**, and they represent Europe in the **Programme Committee of the Science Centre World Summit**. In 2016, the Copernicus Science Centre hosted the conference of the **International Planetarium Society** (IPS) with the participation of 500 representatives of planetariums from around the world. More about the conference on p.23. Our permanent programme also has an international character. Our **Young Explorer Club network** includes clubs from several countries (more about the YEC programme on p. 26).

An example of a highly successful partnership initiated and supported by Copernicus is the **Society and Science Agreement (SPiN)**, bringing together dozens of science centres and other institutions in Poland working in informal education. In 2016, we became one of the organisers of the UNESCO International Science Centre and Museum day (more on p. 38). In 2017 we will host the next Interaction – Integration conference, the main forum of SPiN circles.

International projects at the Copernicus Science Centre:

ESERO Poland is an education programme focusing on space exploration, ran by Copernicus and ESA for the last three years. More about the programme on p. 28.

SPARKS is a project promoting and improving the understanding of responsible research and innovation (RRI) in Europe. The programme is described in more detail on p. 39.

SYNENERGENE (Responsible Research and Innovation (RRI) in Synthetic Biology) is a four-year project aiming to facilitate discussion on synthetic biology and disseminate understanding of this branch of science. The project is implemented by our Biology Laboratory. More on p. 21.

In 2016 we joined the **World Biotech Tour** – a multi-year project popularising biotechnology. It includes a Student Ambassador Programme and supports the development of an educational kit Lab-in-a-Box. In 2017, we will host a cycle of lectures "Paths to Life", featuring talks about genes, medicine, stem cells, cancer therapies and the latest scientific advancements being made by biologists and doctors.

The Copernicus Science Centre is a member of:

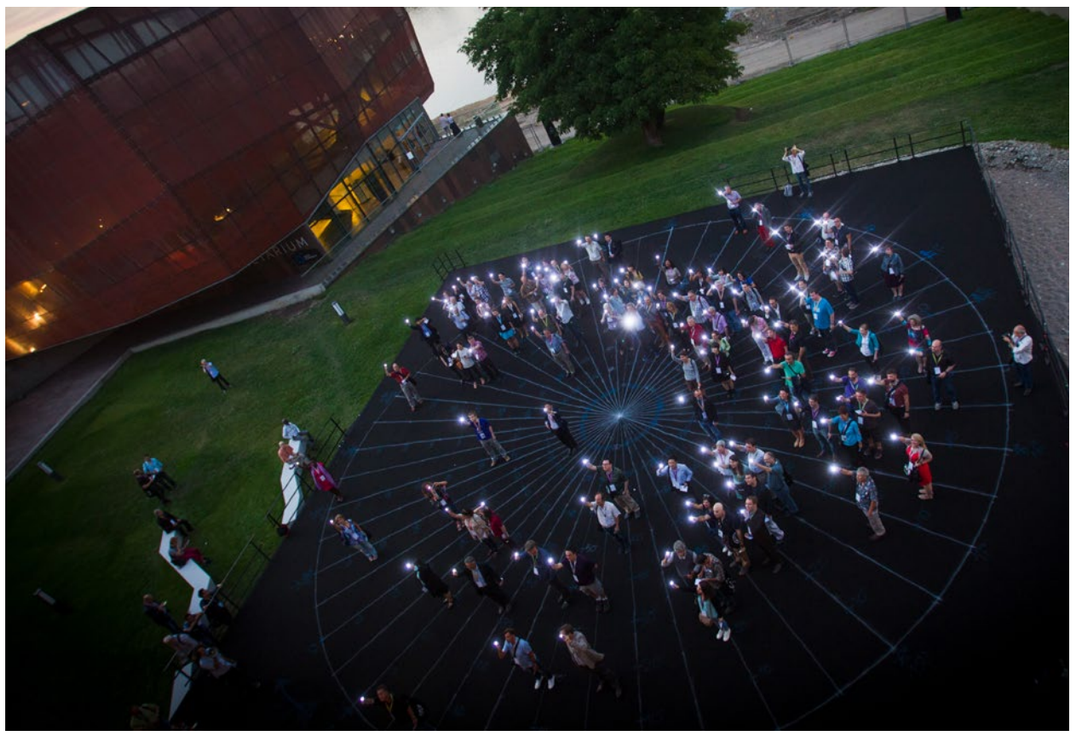
ECSITE (European Network of Science Centres and Museums; Joanna Kalinowska sits on the Annual Conference Programme Committee)

EUSEA (European Science Events Association)

Heavens of Copernicus planetarium is a member of:

IPS (International Planetarium Society; Robert Firmhofer is a member of the IPS Vision 2020 Advisory Group)

ILDA (International Laser Display Association)



Our guests

Guests who visited Copernicus last year include:

Agata Kornhauser-Duda, wife of the President of Poland, and Jakov Kitarović, husband of the President of Croatia (28 January)

Edgar Ghazaryan, Ambassador of the Republic of Armenia, and his wife (23 February)

60 attendees of the NATO Summit (8–10 July)

700 pilgrims to the World Youth Day, who received free entry passes (20–24 July)

The Copernicus Science Centre conducts an extensive programme of free study visits for non-commercial institutions. The programme covers representatives of museums, cultural and scientific institutions, and local and national authorities from Poland and abroad.

Anna Zalewska, Minister of Education, attended our laboratories (9 March)

Hanna Gronkiewicz-Waltz, Mayor of the City of Warsaw, visited the New World in Motion exhibition (18 April)

On 8 July we were delighted to welcome Justin Trudeau, Prime Minister of Canada, and his son. They especially enjoyed the New World in Motion exhibition.

Sponsors

The Copernicus Science Centre is able to operate largely thanks to the support from the Capital City of Warsaw, Ministry of Science and Higher Education, and Ministry of Education. However, their subsidies, combined with ticket sales and our commercial activities, cover just part of our annual expenses maintaining exhibitions and implementing educational and artistic projects. We would not be able to carry out our mission without the support of our sponsors, who are as passionate as Copernicus about promoting science and developing skills essential in the 21st century. Some of Poland's largest companies provide us with financial support as well as joining us to prepare programme activities and providing knowledge, ideas and technologies for joint projects.

Strategic Partner

Since our opening, we have been supported by **Samsung Electronics Poland**. This year, we opened the unique education zone "Samsung – Dot's It". Interactive exhibits reveal the science and technology behind state-of-the-art televisions made by Samsung. More about the educational zone on the properties of nanotechnological objects (quantum dots) in the "Exhibitions" section on p. 15. Additionally, other galleries and the Robotics Workshop are fitted with equipment made by our Strategic Partner, allowing us to create modern exhibits and prepare laboratory scenarios.

Supporting Partners

Together with the power company **RWE Polska** (now **Innogy**) we continued the RWE PowerBox project. The educational kits on generating and using energy have been distributed to a hundred schools across Poland (more about the RWE PowerBox on p. 24). RWE was also the exclusive partner of Tesla Day (more on p. 38).

Polkomtel supports us financially and has been the patron of Family Workshops since 2014, helping us develop science workshops for our youngest visitors (more on p. 18).

Exclusive Laboratory Partners

Our Laboratories have once again been supported by **LNG** and **BASF Poland**. We were joined by BASF to host Valentine's Day activities at the Chemistry Laboratory under the banner "Love is Chemistry" (more on p. 38).

STEM Project Partner

Together with **Boeing**, we support the development of science, technology, engineering and mathematics (STEM) subjects. In 2016 we co-developed the educational kit "Constructors of Dreams" for the most active Young Explorer Clubs (more on p. 26). Boeing also supported Poland's instalment of the CanSat competition held as part of the ESERO project (more on p. 28).

Exhibit Partner

We were joined by **Polpharma** in welcoming our visitors during a weekend dedicated to diabetology. More about the event on p. 38.

Summer in the City Partner

The Summer at the Discovery Park programme was supported by **Planete+**. More about the event on p. 36.

20th Science Picnic of Polish Radio and the Copernicus Science Centre

This year's Science Picnic was supported by Toyota, GlaxoSmithKline and Polish Security Printing Works.

Copernicus Conference Centre

Some of the events we hosted at our Conference Centre:

The **Space Sector Forum** was held on 9 March. The event was accompanied by an exhibition of the achievements of Poland's space research industry with thirty representatives of R&D companies and institutions presenting their projects, products and services implemented thanks to contracts with the European Space Agency.

UX Poland is one of the largest conferences of the UX industry in Europe. The main subject of this year's meeting (11–14 April) was responsibility and sustainability in design. Participants presented examples of products and services designed to not only generate profits but also bring advantages to the communities where they are used.

Lean in STEM is a conference organised by the "Perspectives" Educational Foundation (31 May – 1 June). This year's motto was "STEM Education for Innovation: Women at the Forefront". The aim of the event was to bring together the individuals and institutions working in STEM education and bolstering activities helping women make the most of their potential.

The **7th Innovative Economy Congress**, held on 8 and 9 June, focused on four topics: Digital, Smart Cities, Medical Innovation, and Innovative Infrastructure. The congress featured guests including Jarosław Gowin (Deputy Prime Minister and Science Minister), Mateusz Morawiecki (Deputy Prime Minister and Development Minister), Inga Eriksson Fogh (Swedish Ambassador to Poland), and Michał Olszewski (Deputy Mayor of Warsaw). The event's special guest was Nicola Mendelsohn, Vice President for Europe, the Middle East and Africa for Facebook.

The **European VR Congress**, dedicated to the rapidly-developing virtual reality technologies, was the first event of its scale in Poland. Held on 3 and 4 November, it hosted leading producers of equipment and designers of innovative VR productions from Poland and abroad.

Media

23,013 publications in the media including:

7,852 on Facebook

8,173 online

1,821 on the radio

1,497 in the press

980 on Twitter

761 on TV

665 on online forums

371 in blogs

2,817,998 hits on the Copernicus Science Centre website

123,904 hits on the Heavens of Copernicus planetarium website

12,912 hits on the FameLab competition website

8,003 hits on the Przemiany Festival website

136,061 Facebook fans of the Copernicus Science Centre

20,287 Facebook fans of the Heavens of Copernicus Planetarium

13,570 Facebook fans of the Science Picnic

9,946 Facebook fans of the Przemiany Festival

3,883 Facebook fans of the FameLab competition

Awards

Nomination for the Design Alive Awards in the "Strategist" category for Robert Firmhofer, Director of Copernicus, and Irena Cieślińska, Programme Director. As the selection committee for the competition wrote: "Their activities focus on the future, which is arriving right now. They open up perspectives by highlighting the multitude of creative paths by hosting events such as the Przemiany Festival, which continues to expand into ever new areas and infect children and adults with a fascination in the world around them."

Paszport Polityki 2016 for Anna Smolar, co-author and director of the theatre performance staged at the Przemiany Festival. The play about Henrietta Lacks was produced by the Copernicus Science Centre.

Prof. Henryk Skarżyński, member of the Copernicus Programme Board, has been listed in the **Pantheon of Polish Inventors**.

The Prof. **Maciej W. Grabski Prize** was awarded by the Foundation for Polish Science to Prof. Łukasz A. Turski for his activities promoting the understanding of science in society. Prof. Turski is the Chairman of the Programme Board of the Copernicus Science Centre.

Main Prize for the film "Dream to Fly", produced by the Heavens of Copernicus Planetarium, awarded during the Madrid 2016 Immersive Festival.

Audience Prize for the film "Dream to Fly" awarded during the Fiske Fulldome Festival 2016 in Boulder, Colorado.

Prize for outstanding information policies for Katarzyna Nowicka, Spokesperson for Copernicus (pictured above), awarded by the Science Populariser of the Year competition organised by the Polish Press Agency, the Science in Poland service and the Ministry of Science and Higher Education.

Our Team

Creativity, a constant drive to improve and take up ever more difficult challenges, openness to innovation and experimentation – those are just some of the distinguishing features of our team. We simply never get bored – not with our jobs, not with one another... Perhaps that's one of the reasons for the success of the Copernicus Science Centre?

Following a change to our institution's statutes (in 2015) and an internal reshuffle (from 1 January 2016), the Copernicus team has been focusing on developing its R&D skills. Several of our employees have started postgraduate and PhD courses. In 2016, we continued our programme to improve the management skills of our board and attended several workshops on implementing the latest Copernicus strategy, vision and mission.

At the end of 2016, we had 247 full-time employment positions. We signed 245 annual contracts with explainers selected through the recruitment process during the first quarter. The team now includes 165 explainers who had already worked at Copernicus, and 80 new recruits.

Management of the Copernicus Science Centre

Robert Firmhofer – Director General

Irena Cieślińska – Programme Director

Anna Dziama – Director of Education

Wiktor Gajewski – Director of Scientific and Artistic Events

Joanna Kalinowska – Development Director

Ewa Kloc – Administrative Director

Appointed in the event of major investment projects – Investment Director

Programme Board of the Copernicus Science Centre:

Prof. Łukasz Turski – Chairman of the Board

Prof. Aleksander Bursche – Deputy Chairman of the Board

Prof. Jerzy Axer

Irena Cieślińska

Prof. Magdalena Fikus

Prof. Dariusz Jemielniak

Prof. Krzysztof Konarzewski

Maria Mach

Prof. Henryk Skarżyński

Prof. Tadeusz Skośkiewicz

Hanna Wróblewska

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

Statutes of the cultural institution named the Copernicus Science Centre dated 1.06.2005, with amendments dated 21.06.2006, 26.07.2010, 24.06.2014 and 3.11.2015.

The Act of 25.10.1991 on organising and conducting cultural activities.

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