BEARING WITNESS TO CLIMATE CHANGE
In an interview with Prof. Jacek Jania, a Polish ice expert who studies the glaciers of Spitsbergen, an island in the Arctic Ocean, Jania is chairman of the Polar Research Committee of the Polish Academy of Sciences and head of the geomorphology unit at the Earth Sciences Department of the University of Silesia in Katowice. In the interview, he talks about the implications of global warming.

Climate change and global warming are a hot topic that has drawn a lot of media attention and influenced our daily activities for some time. Many professionals and ordinary people evaluate and interpret these developments from the perspective of their practical impact on our everyday lives. Programs for combating global warming and measures designed to limit climate change take center stage in both national and international policies, because the environmental and economic implications of action and inaction in this area are manifold.

Poland, whose energy sector is based on coal, is taking an active part in the ongoing debate on climate change. The country is making immense efforts to embrace the global agenda and European Union programs in this area.

The interview with Jania shows just how powerful the ties between science, business, and politics are when it comes to climate protection. The professor tells a fascinating story of glaciers that end in the sea and are more sensitive to climate change than glaciers ending on land. He also talks about Spitsbergen, which has drawn Polish researchers for years, and about the significant role that Polish researchers have played in international glaciological programs. All these endeavors have an impact on everyone, on the life of every one of us and on the generations to come.

In another example of ties between science, technology and business, the Jagiellonian University in Cracow and the Regional Blood Donation and Treatment Center in Katowice have set up a consortium to develop “modern treatments for unfamilial diseases.” Blood treatment is an important area of medicine; some 3 million patients in Poland are treated with blood and blood products every year.

Meanwhile, work to establish an Advanced Materials and Technology Center (GAZMAT) in Warsaw, marking Poland’s largest research infrastructure project to date. After it is completed in 2012, the center will work to develop interdisciplinary research into modern materials and technologies. The Warsaw University of Technology, a leading technical university in Poland, is coordinating work to establish the center. The idea is to turn Warsaw into a nanotechnology hub.

In a more traditional sector of the Polish economy, textile and clothing manufacturers are working to lend a fresh, young face to Polish fashion in China and India by introducing new types of products. As part of these efforts, a research and development consortium called the Polish Technology Platform for the Textile Industry aims to develop production of specialized textiles and clothing.

As part of our regular reports on Polish achievements in this area of The Polish Science Voice we describe the privately-run Higher School of Mechatronics in the northern city of Katowice, which provides interdisciplinary training for engineers. Mechatronics is a combination of electronics, mechanical engineering, automation control engineering, robotics, optoelectronics and sensor engineering as well as information technology and computer systems.

The Higher School of Mechatronics admitted its first students in 2005. Today it has about 700 students and the number of applicants is doubling every year.

As usual, this issue of The Polish Science Voice also carries some hot news about what is happening in Polish science and about how Polish technology is winning ground abroad.
What Arctic Glaciers Say About Climate Change

Prof. Jacek Jania, a glaciologist who studies the glaciers of Spitsbergen, chairman of the Polar Research Committee of the Polish Academy of Sciences, and head of the geomorphology unit at the Earth Sciences Department of the University of Silesia in Katowice, talks to Ewa Deren.

The Fourth International Polar Year 2007-2009 ended this March. Ice2sea, a new project financed from European Union funds, began in June to research how polar glaciers contribute to raising the global ocean level. Does this intensification of polar research mean that the world has started to take global warming and its possible consequences seriously?

The International Polar Year 2007-2009 was in a way determined by the calendar—it was organized on the 50th anniversary of the International Geophysical Year (IGY 1957-1958) by the International Council for Science (ICSU) and the World Meteorological Organization (WMO). Still, it was the biggest scientific project in history, involving 64 countries and over 10,000 people who worked on more than 200 research projects.

Ice2sea, coordinated by Prof. David Vaughan of the British Antarctic Survey, is a European project, though the central car with partners from the United States and Russia. The EU has assigned 10 million euros for research under this project, the largest amount of EU funds ever earmarked for studies on how glaciers affect the global ocean level. This knowledge is essential for countries in Europe and elsewhere, because global warming is a fact. Over the past few decades, we have seen a significant decrease in the reach and thickness of glaciers on Spitsbergen, in the Antarctic, and recently in southeast Greenland in particular. Glaciers are the first to react to climate change, which makes them an excellent medium for recording current change but also, when observed in a long-term perspective, allows us to determine if the climate change trends are short-term in nature or likely to last. Glaciers that end in the sea are more sensitive to climate change and more important for changes in the global ocean level than glaciers ending on land. Hence, the main aim of the Ice2sea project is to study the glaciers of the Arctic, and also the Antarctic. More than 20 research institutions from Europe are involved, including two from Poland, the Institute of GISepof of the Polish Academy of Sciences (PAN) and the Earth Sciences Department of the University of Silesia. Studies of glaciers that end in the sea were included in global glaciology thanks to glaciologists from...
University of Silesia. Is it true that you were the precursor of this aspect of glacial research? In 1978, during your second stay on Spitsbergen, you took note of sea-ending glaciers as a potential object of study.

It is true that this early interest in glaciers has turned out to be especially important for the issue of the global ocean level. But I wouldn’t call myself the precursor of this research. Before me, Prof. Mark Meier from the University of Colorado at Boulder studied Columbia Glacier in Alaska from this angle. His studies had a pragmatic reason, though. The port of Valdez is close by, a port of call for tankers taking oil from the Alaskan pipeline. Icebergs can be very dangerous to these huge ships, just like they were for the Titanic. A few years later they turned out to be less dangerous because Columbia Glacier withdrew deep into its branch of the fjord. My own interest in glaciers ending in the sea was driven purely by scientific curiosity. I asked myself what processes were responsible for a glacier “leaving” the water and retreating inland. I managed to infect a group of colleagues with my curiosity and they took up different aspects of this research. Prof. Meier heard about us and invited me to attend a prestigious congress to present a paper on Hans Glacier on Spitsbergen, which was the subject of our research. It turned out there were only two such glaciers in the world at the time—Columbia Glacier in Alaska and Hans Glacier. Today we know of many more, for instance on Greenland and Alaska, confirming the hypotheses of that publication. Research interestily shows that Arctic glaciers, especially those of Greenland, are the leading factor contributing to the global ocean level rise. Hence glaciers ending in the sea are currently the most attractive objects of study in glaciology. We are working in a large international team because this allows for better studies and understanding of the processes involved and their influence on climate change.

Poland is among the global leaders in glaciological research, largely thanks to what scientists here achieved at the Spitsbergen station. Is it true that the station’s crew is predominantly made up of researchers from the University of Silesia?

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The Polish Polar Station at Hornsund belongs to the Polish Academy of Sciences’ Institute of Geophysics. The University of Silesia has worked with the institute’s scientists for many years, mainly with Assist. Prof. Piotr Glowacki’s team. We are partners and complement one another in glacier research going beyond Hans Glacier alone. We also collaborate in glaciology with the universities in Toruń, Poznań and Lublin, and in climate research—with the University of Wrocław. The station’s crew often also includes scientists from other countries. This is in the northernmost Polish research mission that works year-round. Built in 1957, after the first wintering of 1957–58, it was only active in summer. After a thorough renovation in 1978 it has been working year-round. It has been working nonstop—with people spending the winter there every year. Today it is one of the most comfortable and heat-equipped polar bases. The station conducts continuous geophysical research and studies the polar environment. The University of Silesia takes part in all the research projects, our main field being glaciers and the polar environment (frozen ground and the chemistry of water, including runoff). We have good, advanced equipment that we use during all the time. I am about to go to Spitsbergen to set up a new infrared distance finder at Hans Glacier. It should be able to record changes of the glacier terminus position during the polar night, when automatic digital cameras are useless. The glacier is studied using many different methods, both traditional ones like drilling and metrological methods, and with the help of the latest equipment, including sensors installed in the ice, radar sounding of ice thickness and measuring ice movement using GPS satellite surveying.
What exactly can we find out from the current studies of glaciers and what can this knowledge give us in practice?

Thanks to the latest research we have found out that the rising global ocean level is due not only to melting glaciers but also to the mechanical displacement of ice masses from land into the sea—when parts of a glacier break off, resulting in the formation of icebergs. Accelerated glacier melting caused by global warming delivers more melted water to the glacier bed, which reduces friction at the base and accelerates the glacier’s flow. As a result, the glacier calves more intensively, meaning pieces break off into the sea. The water is displaced by the ice, of which just one-eighth is visible above the water surface, and this raises the global ocean level. That’s how sea-ending glaciers work. Smaller glaciers react a little more quickly to climate change, huge glaciers like the Antarctic, for example, have a long delayed reaction. But all polar glaciers clearly say: the climate is warming. This is the most visible today in the Arctic. Sea ice is an especially sensitive indicator. In the fall of 2007, the smallest reach of sea ice in

**FACTFILE**

Prof. Jacek Jania, 59, graduated with honors in geography from the University of Wrocław in 1973 and obtained his PhD there in 1978. He obtained a postdoctoral degree in glaciology in 1988 and became a professor in 1996. His first job was with the State Geodetic Institute in Wrocław. He has been with the Earth Sciences Department of the University of Ślęza since 1975. He has been elected to various posts at the University of Ślęza, working as dean of the department in 1995-1996, and university vice-rector for science in 1996-1999. He is now chairman of the Polish Academy of Sciences’ Polar Research Committee and a member of many scientific societies and committees at home and abroad.

His fields of scientific interest include glaciology, geomorphology, remote sensing and cartography. He has taken part in polar research projects since 1972, beginning with work for his MSc as a student. The main area of his research is southern Spitsbergen (Svalbard archipelago) as well as observations of glaciers in Iceland, Norway and the Himalayas. He has also conducted studies in the Tatra Mountains, the Pomorania region and the Silesian Upland. He has written about 70 scientific papers and three books.
flooded by the sea. The Dutch have coasts. All this is in danger of being and valuable protected areas along their

tries have a great concentration of people. We simply need to learn how to utilize the effects of climate warming, of course without losing sight of the dangers. The savings are obvious. We need to look at this warming to our advantage.

How can we benefit from climate warming?

There are benefits for transport, for instance. In 2007, Prof. Wiesław Masłowski, an outstanding Polish scientist working at the Naval Postgraduate School in Monterey, California, came up with a model of sea ice in the Arctic Sea according to which we will be able to reach the North Pole without an icebreaker in the summer of 2013. Two years ago, this was sensational news. Today, though, we can say there are quite good grounds for this model: If it were to prove correct and the ice cover of the Arctic Sea—just 4.3 million square kilometers, almost 40 percent less than the average from 1979-2005. The rising of the global ocean level cannot be stopped. Today this rise is about 3 mm per year, half of which is due to glaciers melting and the rest comes from the seawater being heated due to global warming. The ocean rising by 3 mm annually means a rise of 3 cm after 10 years, and we can expect the pace to accelerate further. Added to that is storm swelling, with storms reaching further inland with each year. It’s not hard to imagine the consequences for ports, cities and people in coastal areas.

That’s why it’s so important to learn as much as possible about the mechanisms of glacier calving and other processes that determine the impact glaciers have on the sea level. The results will be used to prepare forecasts, among other things. Predicting certain phenomena in advance, we buy time to adjust to living in a warmer climate, or maybe we can find ways to use this warming to our advantage.

The effects of the Fourth International Polar Year will last until the start of the polar night. The IPY is a major global scientific event, its strength lies in international cooperation—various kinds serving scientific involvement over 10,000 people from 64 countries around the world. The program committee received 1,100 research project applications, and 228 of these were approved as priority projects. Most of these projects used the latest technology to carry out the Fourth IPY, The focus was on the signs and effects of climate warming. The general result is that the Earth’s polar areas have become a testing part of scientific investigations of fundamental importance to Earth dynamics, global climate change, oceanography, the geo-
Ministry of Science and Higher Education. However, the intellectual contribution and resourcefulness of Polish researchers allowed us to secure a very good position in terms of developing knowledge about the polar regions. We also had quite a few publications, with about 135 people publishing their results during those two years. Importantly, the researchers included quite a few young people, aged under 35. Many of them established very good contacts with their peers from other teams, which holds well for the future.

Polar research is costly and often dangerous, so only international cooperation can bring genuinely good effects. Both Polish polar stations, the Stanisław Staszic Polish Polar Station at Hornsund in the Arctic and the Henryk Arctowski Polish Antarctic Station, attracted many international research teams during the IPY, and this cooperation will continue well beyond the time frame of the IPY.

What kind of polar research projects involving Polish scientists produced the most noteworthy discoveries?

The projects carried out by Polish scientists during the Fourth IPY were diverse, involving areas such as biology, climatology, geology and geodynamics, oceanology, and, of course, glaciology. Our contribution to the IPY was significant in all these fields. As for glaciers, one critical development that opened up the way to future research was the discovery by the international team of Assistant Prof. Grzegorz Głowacki (from the Polish Academy of Sciences’ Institute of Geophysics) of a lake under Spitsbergen’s thickest ice field, Amundsenisen. Radar studies indicate the presence of water under the 700-meter shell of ice. Drilling is the only way to confirm the existence of a lake under Spitsbergen’s thickest ice field, Amundsenisen. Radar studies indicate the presence of water under the 700-meter shell of ice. Drilling can bring genuinely good effects.

Drilling would also be an excellent way of preparing for finishing the borehole into the famous Lake Vostok under the continental ice sheet of the Antarctic. In another achievement of international status and a lasting contribution to the IPY, we have determined that the West Spitsbergen Current in fact comprises two rather complex currents of Atlantic water. A perceptibly warmer flow of Atlantic water into the Arctic Sea has been observed since 2004. This warmer flow flows across the European continental slope and appears in the region of Spitsbergen, warming it. Studying this phenomenon is the crowning of many years of observation by the team of Prof. Jan Pachur from the PAN Institute of Oceanology in Sopot. Since 1976, the institute has monitored the thermal currents and salinity of the northern Atlantic between Greenland, northern Norway and Spitsbergen—this is an unusual and involved use of advanced equipment during the Fourth IPY. These excellent results were achieved because the observation had been conducted on a rotating basis for a long period since 1976. The Institute of Oceanology’s research vessel Oceania took part in the work, systematically sounding the Grandland Sea. The oceanographic data obtained by the scientists from Sopot were used by Prof. Miłoszewski from California when he developed his model of Arctic ice mass loss. Climatic models didn’t explain the reasons for this loss well enough. It was a combination of climatic models and the oceanographic model that resulted in the so-called “Miłoszewski scenario,” according to which the North Pole could be free of ice as early as 2040. Earlier models projected this would not occur until after 2080. Other interesting findings were obtained in a marine biology project. The team of Prof. Jan Piechura from the PAN Institute of Oceanology pointed out that Arctic species are moving north, ousted by marine organisms found at medium latitudes that are appearing with the inflow of warmer Atlantic water. The oceanographic data, with the inflow of warmer Atlantic water, were used by Prof. Lesz Szymczynski (of the University of Gdansk), on the other hand, discovered the related influence of the changed diet of birds on the vegetation in the Spitsbergen tundra. This documents the impact of climatic warming on marine and land ecosystems.
In climatology, it is worth mentioning the results of Prof. Tadeusz Niedźwiedzki (from the University of Szczecin), who studies atmospheric circulation. Based on studies around the Polish station in Svalbard, he showed that climate warming causes more frequent migrations of low-pressure centers, and thus more frequent weather changes. This is also the reason for the more frequent and intense rains on Svalbard in the summer than occurred in the past. A similar phenomenon is observed in Poland, another area that Prof. Niedźwiedzki studies.

This Polish Antarctic Station on King George Island was very active during the IPY as it is run by the PAN Department of Antarctic Biology. The crew have opened up several new fields of research, including studies of the responses of glaciers to climate warming. Also in the Antarctic, glaciers are shrinking in terms of mass and reach, and ecosystems are advancing into areas newly emerged from the ice. It’s also worth mentioning the outstanding research of Prof. Maria Agata Olech (from the Jagiellonian University), who specializes in bryophytes and vegetation colonizing new areas. She conducted such research in Svalbard where the distribution of plant species in changing cyclone warming. Dr. Malgorzata Blaszczynska (from the University of Silesia) also carried out research related to Svalbard, performing a sophisticated radar interferometry (ASTER) analysis images that yielded the current inventory and determined the state of breaking glaciers in the whole of the Svalbard archipelago.

Yet another field in which Polish researchers had very significant achievements during the IPY were studies of the deep structures of the Earth’s crust at “polar gates”—passages between the Atlantic and the Arctic (the Plates and Gates project). Geophysical probing of “polar gates” is a complicated and costly type of research. It involves setting off explosive devices under the sea and observing the records of sonometers located at the ocean bottom in order to investigate seismic wave propagation, the geological structure of undersea areas, continental drift etc. A major role in this research is played by Prof. Aleksander Guterch (from the PAN Institute of Geophysics) and his team, who have collaborated with researchers from Japan, Norway and the United States as part of this project. Studying undersea areas is essential for understanding the geological development of our planet but also—in combination with identification of geological structures on the surrounding land—it has practical significance in prospecting for undersea mineral resources. It is estimated that the Arctic accounts for almost 10 percent of global oil resources and 30 percent of natural gas. The decline of marine ice will open up the shortest route from Europe to Asia without using ice-breakers, but it will also facilitate access to undersea deposits.

This last project shows how fundamental research can be used in practice. It also shows that the problems of the Arctic are important not only scientifically but also economically and geopolitical reasons. The possibility of mining undersea resources is sure to give rise to specific economic plans and territorial claims. Who decides about the Arctic today?

The final word belongs to the governments of the Arctic countries. A major role is played by the Arctic Council, which brings together countries whose territory lies partially in the Arctic. The council also offers observer status to countries that do not have Arctic territory but have contributed to discoveries in the Arctic; these include Britain, Germany, France, the Netherlands, Poland, and Spain. The observers are starting to speak with one voice because, since they invest in Arctic research, they want—i.e. harmonious cooperation with the Arctic countries—to have a say in accessing and utilizing this important region of the Earth. This, however, is a role for diplomats, not scientists. Today there is talk of a treaty for the Arctic, similar to that drawn up for the Antarctic after the International Geophysical Year (1957-1958). Signed in 1961, the Antarctic Treaty halted any territorial claims and turned the Antarctic into a territory under international control. Such an option is neither necessary nor possible for the Arctic, but a treaty on scientific cooperation, especially in research on climate change, would be advisable.

So far, the International Polar Year has been organized every 50 years. Considering the current importance of polar issues, will this period be shortened?

The next meeting of the group of people who run the IPY office, to be held in Oslo in October, will make the decision—already consulted with various international bodies—on the Polar Year 2010-2020 as a follow-up to the Polar Year 2007. This is a very good idea because we should take advantage of the present rapid pace of research in fields that prove the Earth’s climate to be changing. This is why everyone should be involved in solving the problem and not be stripped of the enormous future potential of the Arctic.
The Polish Technology Platform for the Textile Industry was established on Dec. 14, 2004 by a group of institutions and companies led by the Technical University of Łódź’s Department of Textile Engineering and Marketing. The department’s dean Prof. Izabella Krucińska chairs the platform.

The platform aims to develop Polish advanced textile technologies and “build bridges” between science and the textile industry. This involves initiating and conducting industrial research and fostering rapid application of research results. The platform’s members seek to increase the sector’s competitive edge and are working to promote innovation and new technology in the textile industry.

Cross-border ties

The Polish Technology Platform for the Textile Industry works with the European Apparel and Textile Organization (Euratex), which aims to increase the role of the EU’s textile and clothing industry internationally. The Polish Technology Platform for the Textile Industry also works with another EU organization called the Textile Technology Transfer Network (Textranet). The organization brings together research institutions working in the field of textiles.

In 2004, an organization called the European Technology Platform for the Future of Textiles and Clothing was established under the EU’s Lisbon Strategy to create a “road map” for the sector. The organization has defined the key goals of research and development in the EU textile sector. These include a focus on the production of specialist textiles and clothing with a high added value; a gradual strengthening of research and development in the textile industry; and a shift from mass production to customized and highly specialized products. The organization’s members have developed standards for monitoring the global textile and clothing market, the aim being to facilitate early identification of dubious practices on the part of non-EU countries serving to improve their balance of trade through exports of cheap textiles, and to make sure that the liberalization of trade on the textile market does not harm the position of EU manufacturers.

Poland’s textile and clothing industry, which has been strongly affected by an influx of cheap imported textiles from China and India, remains a regional leader in the EU. The Polish textile and clothing sector comprises about 18,000 companies, including 22 large state-run companies. Most textile and clothing companies in Poland are flexible and capable of rapid change. Many provide outward processing and packaging services for manufacturers from Western Europe and are capable of competing with their counterparts in other EU countries. Despite a shrinking cost advantage, Polish textile exports to other EU countries continue to grow. This is largely because Polish textile producers have extensive experience and a good reputation abroad, according to experts. Moreover, many European clothing companies prefer to place orders in Poland instead of Southeast Asia because Polish textiles and clothing meet EU quality, consumer-safety and environmental standards.

The ProHumanoTex Center for Advanced Technologies, one of the members of the Polish Technology Platform for the Textile Industry, has carried out joint projects with the Association of Universities for Textiles (AUTEX), which coordinates the work of European research centers and universities concerned with textile science and technology.

EU PROGRAMS

The Polish Technology Platform for the Textile Industry is carrying out projects under the EU’s Framework Programs, especially FP 6 and 7. The consortium’s members plan to pursue joint research and development programs together with partners from Western Europe. These include:

1. Protection and Textiles: Micronanostructured Fiber Systems for Emergency-Disaster Wear—Proetex
2. Multifunctionalized Medical Textiles for Wound (e.g. Decubitus) Prevention and Improved Wound Healing—Lidwine
3. Intelligent Multireactive Textiles Integrating Nanofiller-Based CPC Fibers—Inteltex
4. Electrospun Biocompatible Nanostructures for Health Care and Protection—Elbiona

Textile Revolution

Under pressure from cheap Chinese and Indian imports, European textile and clothing manufacturers are working hard to introduce new types of products to maintain their position on the market. In Poland, a research and development consortium called the Polish Technology Platform for the Textile Industry (PPPTI) aims to develop the production of specialist textiles and clothing.
As every cyclist knows, derailleur gears need to be maintained from time to time so that the chain properly shifts from one set of sprocket wheels to another. With time, “free play” sets in though and even the best mechanisms of this kind fail to work precisely. This shortcoming can be eliminated thanks to an invention by a Polish engineer who has filed a international patent application under the Patent Cooperation Treaty (PCT).

What causes problems with classic gears? The ratchet or gear blocking mechanism which serves to shift the position of the chain is located in the gearshift or gear lever at the handlebars. On the way to the chain, there are parts that stand in the way of smooth transmission. This inspired engineer Władysław Hura from the southern city of Bielsko-Biała to come up with an idea to move the gear blocking mechanism from the gear lever, mounted at the handlebar, to the derailleur, or gears proper.

The first of these tasks is related to textiles, electronics and computer science, involving the development and implementation of textronic products such as fiber sensors (FS), fiber actuators (FA), miniature integrated measuring systems (SMS), fiber feedback control systems (FFCS), safety monitoring and control systems (SMCS), fibrous power supplies (FPS), textile technology for nanotextiles (FN), study available electronics (FAE), and fiber electronics (FE).

In the consortium’s research programs, textronic products have military and security applications but they can also be used in medicine and in building complex remote-controlled IT and measuring systems. Textronics involves miniaturization and the use of new materials to develop specialist textiles. Such textiles will contain ceramic nanoparticles, metallic nanopowders, fullerenes and fullerene tubes (nanotubes) to ensure greater durability, flexibility and resistance. The consortium wants to help develop completely new materials, including textiles with high internal electric conductivity. Fibrous products made from biopolymers are expected to replace traditional plastic products used in mass-produced textile goods. Such plastics are not biodegradable and difficult to recycle. The new products will rival natural fibres in properties such as penetrability.

Moreover, the platform aims to develop new methods for recycling textile industry waste to make the industry more environmentally friendly.

According to experts, Poland’s textile sector is destined for rapid growth. A range of new textile materials has been developed, with the production technology provided by domestic businesses. Some of the new industrial fabrics contain wood, plastic and even metals. Polish companies are also taking part in research programs involving textronic fabrics. The first textronic fabrics and fabrics containing nanomaterials should soon be available to buyers from different sectors of the economy.

Marek Majorski
Program for Rural Areas

The European Union has allocated 400,000 euros for a pilot program that aims to launch a “European Masters’ Program for Rural Animators” (EMRA): Some of the funds under the program will go to the Faculty of Sociology of Rural Areas at the Institute of Sociology of the Nicolaus Copernicus University in Toruń, northern Poland.

The EMRA program includes the preparation of a syllabus with more than 10 specialist courses and a textbook, an online platform for learning, and work on certification and recognition of degrees at universities abroad. The project will run until October this year and end in November 2011. The project's coordinators in Poland are Prof. Andrzej Kala and Wojciech Knieć, Ph.D. Knieć says, “These days the EU is putting a lot of emphasis on natural sciences, engineering and biotechnology,” and Kala, “our program involves the humanities, but the European Commission has supported our idea because specialists in rural development will be much sought after in the coming years. They will primarily work for non-governmental organizations, local governments and cultural centers.”

Experts trained under the program will launch EU projects related to rural development, including investment in community-building activities. Such people are in short supply in Poland and elsewhere in Europe today. Statistics show that few sociologists have a good understanding of the changes taking place in rural areas. “These days, important things in the countryside are happening thanks to enthusiasts, but we believe that professionals are needed for that,” said Knieć. “Passionate, energetic people suffice in the beginning but then everything gets caught up in red tape, becomes over-complicated and taking care of it all really takes specialist education.”

Polls show that the work of rural activists is now appreciated enough because they do not have a formal education in this field. Knieć says, “Socialists and experts in rural development will demand international graduation certificates that will be valid across Europe. The certificates will be issued by the Copernicus University, but they will also be recognized by other universities. The project is being carried out by institutions of higher education across Europe, including the Regional Studies Institutes of the Hungarian Academy of Sciences in Gyor, the Extracommunity European Association in Athens, the Institutes of Agricultural Sciences of the Mediterranean University in Chania, and the universities in Helsinki, Valencia, Porto, Rostock and Cluj-Napoca.

“My idea differs from those applied in classic gears,” says Hura. “Classic gears are open-type designs unprotected from dirt and dust. My innovative derailleur is enclosed in a casing with a rubber ‘cordon’ that protects the mechanism from dirt.”

Hura says his invention is “based on the use of a two-way derailleur control mechanism using an endless cable and a simple and reliable transmission ratio mechanism in a closed casing. The relocation of the gear blocking mechanism from the handlebar to the derailleur mechanism means that the derailleur operates remotely by a cable. The transmission ratio is selected accurately and maintained stable, and that the derailleur will not be put out of adjustment but will be resistant to extreme operating conditions and mechanical damage.”

Prototype research has revealed that the new mechanism is reliable and easy to assemble, Hura says. It can be assembled on any bicycle. The inventor has designed the gears especially with trekking and tourism bicycles in mind. The new gears work well under load and are fit for mountain bikes. Design work is in progress to modify the new gears so as to increase shifting speed and adapt it to racing requirements.

“The new derailleur is mostly for those looking for riding comfort and reliability,” says Hura. “My derailleur fully meets these requirements. Most people use simple gears because they cannot afford high-class mechanisms. Thanks to my idea, it will be possible to produce those kinds of luxury mechanisms while keeping the price down.”

“The prototype’s seven-speed free-wheel transmission takes only 0.4 sec. to change gears. Importantly, the derailleur has an encoded gear selection. Thanks to its module design, the mechanism is easy to repair. Unlike in the case of classic derailleurs, it is enough to replace a single part rather than the whole mechanism. For the time being, Hura’s derailleur is at the prototype stage. The designer is looking for an investor to launch production.”

Ewa Dereń
Every year, 2 million patients in Poland are treated with blood and blood products. But only blood compatible with the recipient's blood type can be safely transfused. The Jagiellonian University (UJ) in Cracow and the Regional Blood Donation and Treatment Center (RCKiK) in Katowice have set up a consortium to develop modern reagents for serological tests.

To finance the project, the consortium has applied for zł.1.5 million in funds from the Ministry of Science and Higher Education’s IniTech program. Dominik Czaplicki, a PhD at the Jagiellonian University's Innovation, Technology Transfer and Development Center, says that reagents now used for blood grouping are based on monoclonal antibodies that detect only one type of antigens. However, the reagents are not produced in Poland and have to be imported.

A research team headed by Assoc. Prof. Joanna Bereta, of the Jagiellonian University’s Biochemistry, Biophysics and Biotechnology Department, is working to generate new lines of cells that produce monoclonal antibodies. The university has a specialist laboratory where the researchers can carry out projects of this kind. The Regional Blood Donation and Treatment Center in Katowice is Poland’s only blood donation center producing serological reagents. The consortium of the two institutions aims to develop a technology for the production of blood grouping reagents. Although the technology will not be new by global standards, the project is expected to yield a set of reagents cheaper than their imported counterparts.

Bereta is in charge of the research side of the undertaking. Dr. Katarzyna Rothkegel, head of the Serological Reagents Production Department at the Regional Blood Donation and Treatment Center in Katowice, and Dr. Stanisław Dyląg, the center’s director, are responsible for the commercial side of the project.

“The project is planned for four years—this much time is needed to develop the technology and launch production,” says Czaplicki. “We hope that spending from the national budget will be recouped in five or seven years and that the research will produce savings for taxpayers.”

The consortium wants to carry out the project in two stages. The first stage, research work, will be conducted in Cracow. The second stage will involve preparations to launch production. The reagents will be certified, standardized and approved. Then, the Regional Blood Donation and Treatment Center will begin to produce reagents and sell them in Katowice.

Blood as a Cure

Krzysztof Szczubiała, PhD, and his team at the Nanotechnology of Polymers and Biomaterials Research Group at the Jagiellonian University’s Faculty of Chemistry have been successful in work on new polymer materials for the production of heparin. Heparin is a strong anticoagulant that is often used during surgical procedures. But if it is left in the patient’s blood it may cause dangerous hemorrhages.

The researchers expect to receive zł.238,000 in EU structural funds for the protection of their inventions with international patents. The funds will come under the EU’s Innovative Economy Operational Program, which, among other objectives, aims to help protect industrial property created by research and development centers.

Heparin is sold under various trade names, such as Fragmin, Fraxiparine and Lovenox/Clexane. It prevents the formation and expansion of blood clots. Heparin is most often used in cases of acute myocardial infarction and in cardiac surgery.

In all cases when it is necessary to prevent blood clotting, it is important to ensure a long-term and stable concentration of heparin in the blood. Heparin has a half-life of only one hour or so, which is its major drawback. The Krakow researchers want to prolong the time of heparin release.

Their first invention for which they are seeking international patent protection is a biomaterial called biocminated heparin, which is released in a controlled way for over 10 days. The biomaterial is based on a hydrogel called alginate-hydroxypropyl cellulose. The release speed is controlled by the composition of the material and by the temperature, because the material is thermosensitive.

The material comes in the form of microcapsules, a film, or a film containing microcapsules. It may find application in the oral administration of heparin to patients and in scaffolding for blood vessel tissue engineering. The inventors...
The Cracow researchers also worked to find a way for heparin removal from the blood circulation system. The clinical use of heparin is not limited to cardiac surgery. The drug is also used in other conditions when a fast anticoagulation effect is needed—for example during other surgical procedures and in medical equipment such as renal dialysis machines and oxygenators, in order to prevent blood clumping.

However, despite heparin’s many desirable side effects, it is necessary to remove it from the circulation system after the required anticoagulation effect has been achieved. The method used most frequently is the administration of protamine sulfate, a drug that reverses the anticoagulant effect of heparin by binding to it. Unfortunately, in around 10 percent of patients, the drug causes undesirable reactions that may even lead to death.

Patent pending

Another invention that is waiting for patent protection abroad is a method for removing and neutralizing heparin in blood and saline solutions by means of a modified chitosan. The polymer can be used both in a soluble form and in the form of microspheres or a film. Chitosan is a natural, biodegradable and biocompatible polysaccharide. Its main advantages are low cost and non-toxicity (genipin, which the researchers used for cross-linking, is a natural non-toxic compound found in the gardenia fruit extract). The polymer can be used in two ways—either as a solution that can be quickly administered as an intravenous injection, for instance to reverse the anticoagulation effect of heparin, or in the form of microspheres or a film, which may find application in the production of devices for the extracorporeal removal of heparin from blood and plasma.

The method developed by the researchers yields a product with the desirable effect on heparin existing in different applications. Chitosan is a natural, biodegradable and non-toxic material. The polymer can be easily reclaimed and can be recycled again for removing heparin.

The biomaterials developed by the researchers and the methods for removing and neutralizing heparin with their use are the subject of domestic patent applications. Additionally, Kamil Kamiński, Karolina Zazakowny, Krzysztof Szczubiański and Maria Nowakowska, who headed the research project, have won plaudits from the American Chemical Society for their publication entitled pH-Sensitive Genipin-Cross-Linked Chitosan Microspheres for Heparin Removal.

"The strategy to internationally expand the patent applications in the proposed project involves the use of the international Patent Cooperation Treaty (PCT) procedure and applications to the European Patent Office and the United States Patent and Trademark Office," says Czaplicki.

Piotr Bartosz
Hi-Tech Research Center in the Works

Work to establish an Advanced Materials and Technology Center (CeZaMaT) is under way in Warsaw, marking Poland’s largest hi-tech research infrastructure project to date.

After it is completed in 2012, the center will work to develop interdisciplinary research into modern materials and technologies. Another aim is to spread information about advanced technology among the public.

The Warsaw University of Technology (PW), a leading technical university in Poland, is coordinating work to establish the center. The project also involves other academic and research centers in Warsaw.

The Warsaw University of Technology leads a consortium of scientific institutions working to establish the center using funds available under the European Union’s Innovative Economy Operational Program for 2007-2013. “Establishing the consortium enabled us to seek co-financing for our project,” says Prof. Romuald B. Beck, the CeZaMaT project manager and head of the Faculty of Microelectronic and Nanoelectronic Devices at the PW Department of Electronics and Information Technology. EU funds will cover 85 percent of the costs of building the center and equipping it with state-of-the-art research apparatus, Beck says.

In addition to the Warsaw University of Technology, the consortium includes the University of Warsaw (UW), the Military University of Technology (WAT) and a number of research institutes run by the Polish Academy of Sciences (PAN). The consortium was established in December last year.

CeZaMaT aims to “create a platform for cooperation” for research institutions, both those that are members of the consortium and those that remain outside it, says PW president Prof. Włodzimierz Kamik. Building and equipping CeZaMaT laboratories is designed to achieve the
IN A NUTSHELL

The Advanced Materials and Technology Center (CeZaMaT) is being established under the Innovative Economy Operational Program 2007–2013 (Priority Axis 2; R&D Infrastructure). The project began in 2007 and is scheduled for completion in 2012. EU co-financing will total zl.359 million. The project aims to put an end to a brain drain among young Polish researchers by creating attractive job opportunities for university graduates and persuading them to stay in the country.

CeZaMaT will feature advanced technology systems and specialist laboratories. The center's main eight-story building in Warsaw's Mokotów district will house state-of-the-art laboratories equipped with sensitive measurement apparatus. The sixth floor will house modeling and simulation laboratories known as “calculation clusters,” in addition to storage and administration facilities.

CeZaMaT researchers will also use several specialist laboratories made available to them by the consortium’s members: the Military University of Technology, the Institute of Electronic Materials Technology, the Institute of High Pressure Physics, the Institute of Fundamental Technological Research, and the Institute of Electrical Engineering.

The CeZaMaT project aims to help cope with highly complex scientific problems. Interdisciplinary research is expected to ensure more efficient laboratory management and help reduce research costs.

CeZaMaT will conduct interdisciplinary research into modern materials and technology based on research platforms bringing together experts from various research centers in fields such as physics, chemistry, electronics, materials engineering, mechanics, and biochemistry.
Mechatronics is a combination of electronics, mechanical engineering, automatic control engineering, robotics, optoelectronics and sensory engineering as well as information technology and computer systems.

The Higher School of Mechatronics in Katowice began training mechatronics engineers in 2005, two years ahead of state-owned universities such as the AGH University of Science and Technology in Cracow and the Silesian University of Technology. Countries such as Japan and Germany started teaching specialists in mechatronics 10 years ago.

The Higher School of Mechatronics was established by the Incamminato company, a member of the KSK Kompleksowe Systemy Komputerowe IT group. The school admitted its first students in the 2005/2006 academic year. Today the school has about 500 students and the number of applicants is doubling every year.

The school offers full- and part-time bachelor's engineering courses in mechatronics and technical/IT education, in three areas: industrial mechatronics, image and sound IT, and work safety and production engineering. These courses last seven semesters and end with an engineering thesis and its defense. Graduates earn the title of engineer and can continue their studies to obtain a master's degree.

Why mechatronics?

Technical/IT studies allow students to acquire a combination of knowledge in technology and engineering, IT, multimedia technologies as well as project management, human resources management, psychology and labor law. The school trains engineers in areas that offer especially good prospects for career development, providing them with knowledge that enables them to work effectively in the modern business environment.

"The decision to launch the school was our response to changes taking place in the Upper Silesia and Zagłębie region," says Tomasz Niedziela, MSc Eng., WSM's press spokesman and one of its teachers. "As it moves away from traditional sectors of the economy, the region needs a large number of highly qualified specialists in fields that will determine its future development. Mechatronics is certainly such a field. Experts in mechatronics are able to effectively combine advanced precision mechanics with the latest achievements of electronics, something that is still a rare skill among Polish engineers. That's why mechatronics has attracted development potential and engineers who specialize in it are sure to find jobs in the future."

Many WSM graduates launch professional careers even before they graduate. The school guarantees its students three-month internships in companies from the hi-tech sector. These are not obligatory, but most students take advantage of this opportunity to gain experience needed to work as engineers.

Practical skills

WSM students spend hours working in laboratories and performing practical tasks. The school has 14 specialist laboratories, including three computer labs. All these facilities are fitted with modern hardware and software needed to teach physics, mechatronics, electronics, robotics, IT, animation and related disciplines. The school also has a special multimedia lab where students learn advanced sound and image processing techniques. The university is especially proud of its robotics laboratory, which is fitted with an industrial robot network and enables students to work with Fanuc ARC Mate 100i and Kawasaki industrial robots as well as educational robots such as Rose-Bot, Hexapod, Quadrupod, Lego Mindstorms, Lynx 6 and a Puma mechanical manipulator for demonstrating how robots are built. Small walking robots always steal the show at robot exhibitions. Niedziela says, but their main role is to be an excellent teaching aid.
"We invest strongly in our laboratories and use software that is not even available at some large state-run universities," says Niedziela. "This kind of equipment requires substantial financial outlays."

WSM students can work in the labs after school hours and prepare their graduation projects there. "Our main goal is for graduates to easily find their place on the labor market; they can practice on the same kind of equipment that they will later use at work," says Niedziela.

The school’s staff combine teaching with research skills and interdisciplinary competence that they have acquired while working in industry and business, Niedziela says. "The teachers’ experience in industry and business allows them to provide students with practical knowledge needed to meet the requirements of their future employers," he says.

The school has 53 teachers, including six professors, two teachers with post-
doctors, and 20 PhDs. Some of the school’s teachers also work at other technical universities.

“Your strategic goal is to build our own teaching faculty,” says Marek Kluszczyński, chancellor and founder of the Higher School of Mechatronics. “The thing is that we need experts in a number of narrow fields here. That’s why some of the instructors aren’t necessarily scientists but specialists in a given field. For instance, we have a photographer from the ZPAF Association of Polish Art Photographers.”

**Competence Academy**

WSM works closely with the Competence Academy, a training/educational center established by the KSK group to provide training services in personal data protection, information security, and IT system configuration and security.

The center offers training courses for institutions, state enterprises and private businesses, in addition to specialist workshops for those training to expand their knowledge of information technology and IT system security. The courses are also available to WSM students for a reduced fee.

The Competence Academy is certified by the Microsoft corporation as a Microsoft Gold Certified Partner for Learning Solutions.

The Competence Academy has introduced an Integrated Quality and Information Security Management System meeting the PN-EN ISO 9001:2001 and PN-ISO/IEC 27001:2007 standards, one of a few such systems in Poland’s IT sector.

**Advancing technical education**

Every year in May, the Higher School of Mechatronics organizes a Mechatronics Festival. This year’s festival, the fourth to date, was accompanied by events including the Third Planetary Robot Festival and the First Mechatronics Olympics.

The Mechatronics Festival is intended for students from technical secondary schools in Silesia province. The idea is...
In the fall, WSM plans to hold an event called Silesian Innovation Workshops in association with the Silesia Province Marshall’s Office. According to Kluszczyński, many companies still do not know how to apply for funds for innovation, preferring to invest in the traditional way. “This could mean that we won’t be able to take advantage of the huge amounts of theory I had to cram into my brain. We knew how to derive any mathematical formulas and describe a host of physical phenomena through equations, but what I really needed to learn was how to do simple tasks of an engineer who was a specialist technical school of higher education. I think this is a very logical system, optimally adapted to the requirements of today’s industry and labor market. The focus on the practical side of engineering in NOIPS’s teaching strategy has the added aspect of helping graduates set up and run their own manufacturing and service businesses.”

Poland, industrial mechatronics set manufacturer Macheteria, and robot producer Roboship.

Just four years ago, technical secondary schools in the region had problems recruiting students. With such success, robot festival held by WSM, the popularity of technical disciplines among young people in the province increased significantly. Today technical education in the region has changed completely. Mechatronics courses in secondary schools attract more applicants than the number of places available.

WSM not only develops young people’s interests but also provides special staff for technical schools by training mechatronics teachers. WSM offers postgraduate courses in mechatronics for technical secondary schools in Poland. These are not WSM’s only postgraduate programme. There is also the, Information Security Management—Security Audit and Security Policy,” offered in association with the Information Systems Audit and Control Association (ISACA).

According to Kluszczyński, many companies still do not know how to apply for funds for innovation, preferring to invest in the traditional way. “This could mean that we won’t be able to take advantage
of all the funds earmarked for innovation in our province," he says.

During the Innovation Workshops, advanced technology providers could meet with potential buyers and attend lectures discussing case studies from various sectors of the economy. This could serve to make small and medium-sized businesses more open to innovation, Kluszczyński says.

In March, WSM signed a letter of intent with the city of Katowice to establish the Katowice Center of Innovation and Technology Transfer. The aim is to promote ties between academia and business. "We are convinced that contacts between science and business should be expanded. That's the purpose of the project," says Kluszczyński.

New courses

WSM plans to launch three new courses in the near future; it has applied for clearance from the Ministry of Science and Higher Education.

One of these new courses is in production management and engineering, with a special focus on advanced technology in areas such as industrial automatic control engineering, digital media engineering, and information and security management in IT systems.

Another planned course involves cultural studies with a focus on electronic media. The aim is to expand the school's engineering profile to include the humanities. This course is intended for students who are interested in computer science but are discouraged by the large amount of math and physics teaching involved. "We want to attract people with artistic skills," says Niedziela. "Some students can be great graphic artists, photographers or filmmakers without necessarily loving math, physics or chemistry. Such students will find a place at our school. And we hope that we'll finally have more women students."

Today women account for just 8 percent of WSM's students. The school's managers say they are bending over backwards to increase the figure. Last year WSM reduced its registration fee for female applicants to a token zł.1. To attract more students to full-time courses, the school has cut the tuition fee for the first semester by half. The best students are eligible for discounts throughout their studies.

WSM is working to establish ties with schools and institutions abroad. It is interested in working with several foreign universities with a similar profile. The school's strategic objective is to build a strong academic center training professionals in technical disciplines as well as providing an art/humanities course linked to IT and engineering.

Another objective, WSM managers say, is to build a strong scientific team capable of providing high-standard instruction and research, while contributing to projects benefiting the region's small and medium-sized enterprises. Ewa Dworak

Photos: WSM archives
EU Funds for Research Projects

Two Polish centers of excellence have received funds under the European Commission’s Seventh Framework Program to develop research in biotechnology and molecular biology.

Cyprian Tomasik, manager of the Animbiogen project, says the Center of Excellence will carry out comprehensive research in areas such as production of animal raw materials and foods with optimal nutritive values.

“Foods like these, such as milk, meat and eggs, should be rich in what are known as bioactive components, or antioxidants,” Tomasik said. “The content of fat in this kind of food should be reduced to the essential minimum and the food should also contain little cholesterol. Moreover, they should contain as much polyunsaturated fatty acids as possible, especially from the n-3 group. This is of particular importance to consumers now that Europe is experiencing an upsurge in lifestyle diseases such as cancer, obesity, hypertension, diabetes, osteoporosis and allergy.”

The Animbiogen project aims to improve the efficiency of both basic and advanced reproductive techniques in order to multiply specific genotypes of farm animals. They will work with small and medium-sized enterprises, food producers and agricultural businesses and companies involved in biotechnology and biomedicine, for example by organizing seminars and business meetings. Trade fairs and other events in Poland and abroad will enable the researchers to promote the work of the Center of Excellence and spread the know-how involved.

Scientists without borders

The project will involve an international exchange of scientists and joint understandings as part of European research networks. Plans include the recruitment of experienced scientists from abroad and organization of international science conferences and workshops. The Institute of Genetics and Animal Breeding is preparing to buy specialist equipment and expand its research capacity.

According to Urszula Wyrzykowska from the International Institute of Molecular and Cell Biology, the Polish scientists and their partners in Britain, in Lithuania, Italy, the Netherlands, Germany, Norway and France will analyze amino acids that modify index acids of potential significance to biotechnology. The research will also concern issues such as the growth of tumors and the development of the brain, the molecular mechanism underlying Alzheimer’s disease, endogenous proteins and immune transmission in cell, citizen proteins and diseases caused by the improper functioning of cells.

The researchers are planning to organize international workshops, seminars and conferences to discuss the results of their work with scientists from other countries. The International Institute of Molecular and Cell Biology is preparing to strengthen its research capacity by hiring experienced scientists with P.D. degrees. Their task will be to train postgraduate students working at the institute.

The project began April 1 and will continue for three years, over which time the International Institute of Molecular and Cell Biology wants to become a leading center for protein research in the region.

Piotr Bartosz
Scientists, technicians and engineers disagree: some say there’s no progress without patents; others say it’s not patents but their practical application that counts. Who is right? When is a country innovative?

The Polish economy needs innovation, in both the manufacturing sector and services as well as the public sector. The new intellectual property management courses being developed today are part of a broad range of measures essential in this area. This is definitely not a fad but the only way to go. Poland faces a great deal of grassroots work toward something completely new or previously neglected: building respect for innovative thinking and guaranteeing protection of property rights for the products of human thought. Innovative ideas have become a commodity and are valuable, for the thinker and for the owner—a university or research center. They also have a price for anyone wanting to buy this commodity and use it to increase their competitive edge in business. This is especially true of companies with global operations. We are talking about something more than just looking at league tables to see what place we occupy in terms of the number of patents.

Work is in progress to launch a master’s course for intellectual property management experts. Won’t this project overlap with the work of patent agents, on one hand, and technology transfer centers on the other? IP management experts will be agents of positive change in the future, they will promote, stimulate and use innovation in all areas of the economy and in public life. In the institutions that hire them, they will work at strategic levels, not at the operational level that is closer to what patent agents or technology transfer centers do.

What is the greatest barrier to the development of innovation in Poland? The barriers are much more complex than one might think. Patent Office bureaucracy is not a barrier. The process of granting protection is lengthy because solid testing before issuing a certificate has to take time. There are many requirements during the testing procedures, including checking whether there is any potential military application for an innovation. This can be no latitude here, and this is a long process even in technologically advanced countries. Funding is not a problem today, either; the main problem is the lack of an ability to make a clear transition from an idea to business. But inventors often complain of the high costs of patent protection, for example at the European Patent Office, and also of problems with loans for innovations and support for projects involving state-of-the-art technology. Is this changing for the better?

To find an application for an idea and to implement it, you need to find an investor, and this requires a simple language that is understandable. Inventors’ extremely original ideas are wasted by a complete failure to translate them into business ideas. Investors see nothing in the ideas that would encourage prospective implementation. They don’t see a business project. The science community tends to put pressure on government institutions to obtain more funds for research. The business community, on the other hand, thinks science offers too little in terms of solving current problems. These communities have to be brought closer together, and that’s where business schools could play a useful role. The scientific community needs to be shown the huge potential in being able to present research capabilities as a commodity. It is only by showing that it has specific research potential and by being able to boast the highest standard of...
INTELLECTUAL PROPERTY

Will disseminating knowledge on IP management have any real impact on the Polish economy? What specifically could it change?

The capacity to conduct research is becoming a commodity, so we need to find a transaction platform and send a signal to scientific circles that they have to open up to the expectations of the corporate sector, but also society. This is something completely new but it’s gaining importance. Oxford University has the Said Business School; one of the elements of its strategy is social entrepreneurship. This turns out to offer huge openings for business activity. One example is helping people in Africa by building and tying together a system of mobile phone networks and earmarking small surcharges on the price of calls for social purposes, for example for expanding the telecommunications network in Africa. On one hand, this puts pressure on government institutions to provide funds to poverty areas, but on the other it means stimulating companies to develop nonprofit activities next to their strictly business operations.

What is the role of schools of higher education, especially business schools, in building a knowledge-based economy and innovative business?

Going back to IP management courses, the important thing here is not to focus exclusively on activities in just one sector, but to look at education more broadly. University courses should be interdisciplinary and build broader values. Poland’s leading universities are involved in developing new IP management courses, working with the support of Stanford University. Students will be able to experience an education cycle that builds broad competence and at the end to carry out a business project transferring an idea from a technical, medical, agricultural or economic field to specific practical applications. This is what education has to be like today, because it means the possibility to take advantage of the achievements of different disciplines. The conclusion of the cycle should be to encourage students to run their own business. Growing interest in conducting business operations on one’s own account is what we need today, and a movement promoting effective intellectual property management makes huge sense.

ARCHITECTURE

The Silesian Industrial and Technological Park is the only business cluster in Poland that specializes in architecture.

The park is home to the "Architecture and Construction" Incubator of Innovation in Technology and Services and the Architecture-Construction-Surveying Service Cluster.

The Silesian Industrial and Technological Park was established in 2004 as the Silesia Industry Park and its primary goal was to take care of the redevelopment of areas and facilities left behind by defunct coal mines—Polka-Wirów in Swiątochłowice and Walenty-Wawel in Ruda Śląska.

The park was founded by the cities of Ruda Śląska (98.03 percent of the initial capital) and Swiątochłowice and three large industrial companies operating in these areas. The main idea was to breathe fresh air into business and social life in the area, officials say.
The park benefited from funds for new infrastructure and redevelopment projects available under the European Union's Improved Competitiveness of Enterprises Sector Operational Program. The funds were used to convert dilapidated industrial spaces into elegant office buildings and modern production facilities with an area of around 15,000 square meters. In the first stage of its operations, the park attracted 30-odd small and medium-sized enterprises.

New technology, new direction

In 2008, the park managers started working with the Silesian University of Technology in Gliwice and the AGH University of Science and Technology in Cracow, a collaboration that resulted in new ideas for the future of the park and its transformation into the Silesian Industrial and Technological Park. The main focus shifted to new technology and innovation, especially because many of the EU funds set aside for 2007-2013 were earmarked for innovative projects.

“This was a very interesting transition from an industry park to a technology park,” said Roman Trzaskalik, chairman of the Polish Forum of Industry and Technology Parks. “Such transformations of existing parks are rare, but very beneficial, because they testify to well-considered development strategies.”

Architecture, surveying and construction technology are the key focus of the park. Scientific support for the park is provided by the Faculty of Architecture and Urban Planning of the Silesian University of Technology. The park also works with the University of Science and Technology in Cracow, especially its Faculty of Mining Surveying and Environmental Engineering based in Ruda Śląska-Końcówka.

Construction first

The "Architecture and Construction" Incubator of Innovation in Technology and Services opened at the Silesian Industrial and Technological Park last fall. It uses facilities formerly occupied by the defunct Wojtyła-Wawel coal mine in Ruda Śląska. The incubator offers modern office space for firms, including space intended for service and design companies and specialist space for large design teams. Conferences and trade fairs are also held there.

The "Architecture and Construction" Incubator of Innovation in Technology and Services occupies a total of 5,800 sq m of space. The incubator’s goal is to help young architects and construction experts start their own businesses. Benefitting from professionalATING, graduates of the Faculty of Architecture and Urban Planning of the Silesian University of Technology can launch their businesses as part of the incubator.

Last year, the Architecture-Construction-Surveying Service Cluster was established as an initiative by small companies specialized in surveying and architecture. At present, the cluster brings together 14 companies.

The park has applied for around 2.8 million in EU funds for modern land surveying and architectural equipment complete with appropriate technology. Companies operating in the cluster hope they can become more competitive on the market thanks to modern equipment, training and cooperation with universities.

Last fall also saw the opening of another new building at the Silesian Industrial and Technological Park, a production and storage hall in Ruda Śląska. Located over 8,000 sq m, the new facility comes with a stacking yard of 11,200 sq m. The complex has been adapted for the production of steel structures, an operation that was launched in April this year.

The Silesian Industrial and Technological Park currently has over 1,000 hectares of land ready for development, located in the heart of the Silesia conurbation and offering convenient access. Thanks to a modern freeway, getting to Katowice, the main city of the Silesia conurbation, takes only 15 minutes, park managers say.

The more the merrier

Work on a new Park Development Strategy was recently completed. “In the strategy, we precisely define our mission and goals for the coming years,” says Piotr Błażyca, chairman of the park’s management board. The strategy focuses...
on the redevelopment of post-industrial areas, the primary goal of the community.

The mayor of Świerchiń has promised to contribute more land and buildings to the Silesian Industrial and Technological Park, including buildings left behind by the former Polska coal mine and a historical building that used to house the offices of the community authorities.

“We will continue adapting new land, seek investors and support them in what they do,” said Blaszczyk.

The park aims to use EU funds assigned for innovation in architecture and surveying. The park’s managers have submitted two large projects for co-funding. One involves the Architecture-Construction-Surveying Service Cluster and the other is concerned with business plans and feasibility studies for 10 large companies.

By 2014, the park aspires to have 200-250 companies operating within its premises, Blaszczyk said.

Supporting culture

The Silesian Industrial and Technological Park plans to combine business with culture. After all, architecture is a form of art, the park’s managers say, and therefore they want to help promote architecture-related arts such as painting. The park has already hosted several exhibitions of paintings and photographs by Silesian artists. It has also staged a large exhibition of paintings from the Silesian Collection of Contemporary Art, courtesy of the Foundation for Silesia.

The Silesian Industrial and Technological Park aspires to become a major center and meeting place for the local business community. It holds Christmas Eve meetings for entrepreneurs and charity balls. As part of its regular activities, the park organizes business breakfasts for entrepreneurs in Ruda Śląska and Świerchiń.

The park’s managers hope the cluster will raise its profile as a center of creativity and innovation by supporting art, inspiring and fostering partnerships between technology-related companies and institutions, and organizing business and cultural events.

Last year the park was singled out for praise in a local competition for launching the “Architecture and Construction” Incubator of Innovation and for opening modern production and storage facilities in Ruda Śląska.

Ewa Dereń

Photos: The Silesian Industrial and Technological Park archives
IN BRIEF

Fuel from Carbon Dioxide

The Maria Sklodowska-Curie University in the eastern city of Lublin and the Lublin-Wroclaw Heat and Power Plant will work together to develop technology to obtain methanol from waste carbon dioxide and convert it into fuel.

Pioneering Surgery

The world’s first double implantation of middle ear implants in a patient with a serious hearing impairment has been successfully performed in Warsaw by Prof. Kazimierz Niemczyk, head of the Otolaryngology Faculty and Clinic of the Medical University of Warsaw. The surgery was performed on a 29-year-old man whose hearing had suffered serious damage from ototoxic drugs he was given as a child.

Middle ear implants are an alternative for those patients who for various reasons cannot or do not want to wear hearing aids. The implants improve hearing by amplifying the vibrations of the eardrum. The surgery in Warsaw employed American implants that were wholly placed inside the middle ear without the need for any external parts. The surgery was simultaneously performed on both ears thanks to a system of objective hearing monitoring during the operation. The system enabled surgeons to fit the implants with maximum precision and ensure their optimal operation.

The system has been developed by specialists from the Medical University of Warsaw at the Public Central Teaching Hospital on Banacha Street in Warsaw. The operation is being carried out by a consortium led by Prof. Elżbieta Frąckowiak, has developed a laboratory prototype.

When completed, the project will allow experts to move on from laboratory research to industrial production and start work on mobile applications of “super capacitors” in passenger cars, commercial vehicles, farming machines and buses. New laboratory infrastructure would also enable research on stationary applications of such capacitors in solar-battery systems and wind farms.

Eco-Friendly Capacitor

Researchers in the western city of Poznań are working on the prototype of a bipolar capacitor that will be cheaper and more environmentally friendly than capacitors used at present. The device may become an inexpensive source of energy to propel cars, farming machines and other vehicles.

The new capacitor has excellent capacitance and short charging time compared with other energy-storing devices, the researchers say. Such capacitors are used in prototype hybrid cars and automatic industrial systems.

The new capacitor could also become a power source for cars, streetcars and train engines, the researchers say. It could also become a power source for various other devices.

Until now European manufacturers used accountable to make such capacitors. The compound source high voltage to the capacitor, but it is potentially dangerous because of hydrogen cyanide liberation.

When completed, the project will allow experts to move on from laboratory research to industrial production and start work on mobile applications of “super capacitors” in passenger cars, commercial vehicles, farming machines and buses. New laboratory infrastructure would also enable research on stationary applications of such capacitors in solar-battery systems and wind farms.

The Andrzej Sołtan Institute of Nuclear Studies in Swarzędz near Warsaw has joined an international research team working to build a Japanese Experiment Module—Extreme Universe Space Observatory (JEM-EUSO). The project aims to develop a telescope to observe phenomena triggered in the atmosphere of Earth by ultra-high-energy cosmic ray particles.

The Japanese Space Agency (JAXA) plans to put the telescope in orbit in 2013. The telescope will be attached to the Japanese Kibo module of the International Space Station (ISS) and will monitor the atmosphere to an area of up to half a million square kilometers for three to five years.

“We are bombarded by particles from space with energy which is millions of times higher than that of particles observed in the Large Hadron Collider (LHC),” says Jack Szabelski, PhD, from the Department of Cosmic Ray Physics of the Institute of Nuclear Studies in Warsaw. “Watching their effects on the atmosphere, we get a chance to discover phenomena that will most likely lead us to a new brand of physics.” According to Szabelski, the telescope will allow researchers to
watch anywhere from 350 to 1,700 such extraordinary particles a year.

The scientists plan to film the flashes at a rate of several hundred thousand frames per second, which will allow them to see how cascades develop and determine the impact and direction of every high-energy particle.

The JEM-EUSO telescope is in the final preparation phase before construction begins. Researchers from the Department of Cosmic Ray Physics are working on a prototype power supply system for the telescope’s high energy detector. The prototype will meet specific power, weight and shielded-cable criteria.

The ¸ódê team has come up with a method to facilitate the unload- ing of containers with loose materials how sturdy its structure is.

Knowing this, specialists can establish how safe it is to utilize a given silo and calculate the distribution of pressure of granulated material against silo walls.

The main problem associated with the storage of loose materials is that the volume of the material changes when a container is being emptied. This is vital to analyze the distribution of pressure of granulated material against silo walls. Knowing this, specialists can establish how safe it is to utilize a given silo and how sturdy its structure is.

The Mars Reconnaissance Orbiter (MRO), an American space probe that reaches down to the planet, is equipped to send photographs to the computer network of the University of Bern in Switzerland. The photos will be the basis for USING the software for more than six months.

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The Mars Society Polska is a division of the Mars Society, an international organization that aims to encourage the exploration and settlement of Mars. Founded in mid-1998, the organization has attracted the support of notable science fiction writers and filmmakers, including Kim Stanley Robinson and James Cameron. The organization is dedicated to the political and legal groundwork of the benefits of Mars exploration, as well as exploring the possibilities of private Mars missions.

NASAs USE POLISH SOFTWARE

As it analyses the surface of Mars, the U.S. National Aeronautics and Space Administration (NASA) will soon begin using software created by Jan Kotlarz from the Polish division of the Mars Society. The European Space Agency (ESA) has been using the software for more than six months.

Kotlarz, who works at the University of Warsaw, has written the Rover and Orbiter Delta Mars (RODM) application to help explore Mars using the Mars Reconnaissance Orbiter’s highly precise calculations performed by the software make it possible to monitor the Mars mission hours by hours.

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Over a dozen Polish researchers are involved in the JEM-EUSO experiment. They hail from the Institute of Nuclear Problems in Swarzędz, the Jagiellonian University in Krakow, the University in Kielce, and the Podlase Academy in Siedlce.

The Faculty of Applied Computer Science of the Łódź University of Technology is working on innovative methods to monitor and control industrial processes using computed tomography scans. The researchers have developed a method to facilitate the unload- ing of containers with loose materials used in the chemical, construction, pharmaceuti- cal and food industries.

Many people associate the word “tomography” with the method of medical diagnostics. Few know about the wide range of applications the technol- ogy has in industry. Process tomography makes it possible to “look” inside emptying containers without inter- ference with the production itself. Thanks to tomography, it is possible to make images of what is inside an object even if it walls are opaque.


Around 60 percent of raw materials used in industry are stored as pellets or powder at some production stage. Silos of different sizes and shapes are used and the type of material and transpor- tation line for further proces- sing.

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The Łódź team has come up with a method to monitor containers being emptied using electrical capacitance tomography (ECT). This non-invasive technique to visualize industrial processes makes it possible to determine the distribution of material in a silo while the silo is being emptied by measuring electrical capacitance on electrodes around the container. ECT collects the data at a fast rate, as a result of which the controlling mod- ule is able to respond to any unex- pected occurrences in the shortest possi- ble time.

Compiled by Tadeusz Belarski