

# Get Smart

# #5

Interview  
**Zdeněk  
Peroutka**

Theme  
**Modern Energy**

Double Interview  
**Jan and Roman  
Zdebor**

**RESEARCH, DEVELOPMENT AND INNOVATION IN THE PILSEN REGION**

Published in December 2023 as part of the Project Smart Accelerator for the Pilsen Region III

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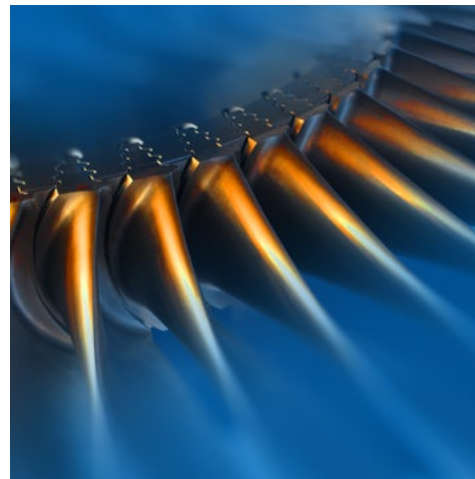
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*The color-adjusted photo shows part of the impeller of a steam turbine with blades, developed and manufactured at Doosan Škoda Power.*

GetSmart #5

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Editors: Petra Vomelová, Michaela Jirovcová, Jáchym Klimko

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Dear readers,

The information presented in the following pages may be of interest to researchers, developers, innovators, investors, or students. I would like to talk about at least one of those topics – one that is perhaps the most talked about these days: artificial intelligence. Even though AI has been used for a long time now, its popularity and use is growing at a rocket speed. It is becoming a routine part of our everyday lives: be it in the economy, engineering, agriculture, healthcare, fashion, or tourism. AI can help with sales optimization, improve machine maintenance, increase production output and quality, improve customer service, as well as save energy. Artificial intelligence used in public services can reduce costs and offer new opportunities in public transport, education, energy and waste management, while improving product sustainability. People have been voicing their concerns about the dangers of AI, its potential misuse and the need for restrictions. Personally, I do not think restrictions are the way to go. Let us give AI a chance and make the most of this opportunity to take us forward in research, development and innovation. I firmly believe that most people will utilize the benefits of AI to improve their daily lives. I want to thank all those who are contributing to the development of our country. The Pilsen Regional Council and Board will certainly continue to support all meaningful initiatives leading to the prosperity of our region.

I wish you the best of luck, many great ideas and the drive to implement them.

**Petr Vanka**

**Deputy Governor for Regional Development,  
IT and European Affairs**



Let us give AI a chance  
and make the most of  
this opportunity to take  
us forward in research,  
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innovation.

# News from the Region you Must Not Miss



## GoHigher. This Is Where You Can Find Yourself.

The Pilsen Region has been dedicated to supporting gifted and talented students for more than 14 years. It organizes a number of extracurricular activities in leisure education facilities, as well as district and regional rounds of academic competitions for gifted primary and secondary school students. These and other activities have gained much more momentum from 2023 onwards thanks to the Smart Accelerator for the Pilsen Region III project. One of the region's first projects was the launch of the website [www.podporatalentu.cz](http://www.podporatalentu.cz) with a new graphic design and significantly expanded functionalities, and the creation of a new brand, "GoHigher." The main task of the project supporting talented high school students is to build a community of talents where students can "find themselves" and meet similarly oriented young people. In addition to several interesting field trips, 2023 saw the first of the informal GoHigher Café meetings, where students share their experiences and where they can meet and make friends.

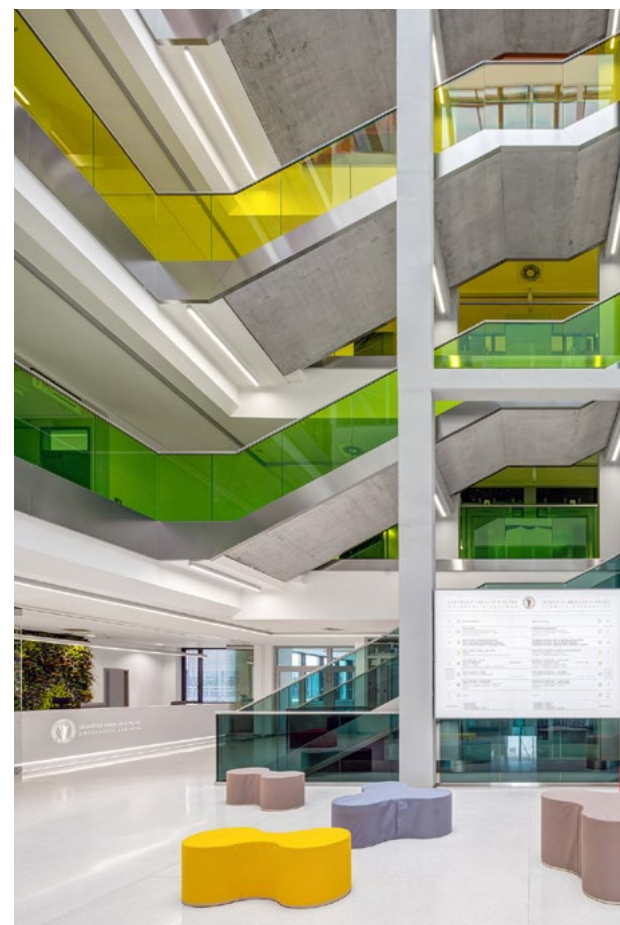
## Award-Winning Campus

The new main building of the Faculty of Medicine of Charles University in Pilsen has been awarded the 2022 Pilsen Region Building of the Year Award, thanks to its superior design which combines outstanding architecture with excellent functionality. One of the building's significant features is the unifying color concept of the interior, all the way down to the furnishings and accessories used. The building also won the Public's Award, having received the highest number of online votes. However, the highest accolades have probably come from the building's users, as expressed by the Faculty's Vice Dean for Development and Public Relations, Professor Dana Müllerová: "The Faculty is really beautiful – so beautiful that students have really taken the advantage of the fact that the building is open 24-7. They simply want to be there."



## Pilsen is Quantum!

A project to study quantum materials is underway at the University of West Bohemia in Pilsen, specifically at the NTC (New Technologies Research Center). The project "Quantum Materials



for Applications in Sustainable Technologies" has succeeded in the prestigious Teaming for Excellence call of the Johannes Amos Comenius Operational Program. The international scientific team led by researchers from the University of West Bohemia will focus on researching materials with the potential for use in quantum computers, sensors, integrated circuits, or energy-saving electronic devices. The goal of their scientific endeavor is to study materials with specific properties explainable by quantum physics, and thus contribute to their better practical utilization. The principal investigator of the project is NTC UWB, co-investigators are the UWB Faculty of Applied Sciences, Faculty of Mathematics and Physics of Charles University, Faculty of Science of Masaryk University, and CEITEC Research Center of Brno University of Technology.



## Tram Depot Goes Green

The vast reconstruction and revitalization of the tram depot in Pilsen's Slovany district, which was carried out under full operation, has received the 2022 Pilsen Region Project of the Year award from the Association of Construction Entrepreneurs. After 80 years of operation, the Pilsen Public Transport Company has renovated the building following the concept of blue-green infrastructure, including a green roof with an area of about 13,500 square meters, and an irrigation system for greening the building walls. The Slovany depot reconstruction project won its first award even before the opening ceremony in March 2023: first prize in the prestigious Global Light Rail Awards in the Project of the Year over €50M category. In early November, the building also won an award in the Adapterra Awards in the "Work Environment" category.



## TechTower Reaps Success

The TechTower modern technology park, which was created by revitalizing the former Světovar brewery in Pilsen's Slovany district, has already won several professional awards. It was awarded the Ministry of Industry and Trade Award for the exemplary transformation of a brownfield into a state-of-the-art research center in the 2022 Pilsen Region Project of the Year competition.

TechTower also made it to the final of the European Regiostars competition, where it competed for two prizes – the Expert Award in the Competitive and Smart Europe category and the Public Award, in which selected finalists compete across competition categories. The winners were announced in November. TechTower placed among the five most successful projects in the Competitive and Smart Europe category, which focuses on innovative economic transformation. However grateful we are for the awards, however, it is much more important that TechTower serves the purpose for which it was created. The many small- and large-scale events that have taken place, which have not only been very interesting and successful, but also very well attended, such as AI Days, PechaKucha Night Pilsen Science Edition II, or Marketing Pilsen, amply prove that this space, where many innovative companies, startups and individuals have found refuge and where SIT Port, which educates young enthusiasts in new technologies, is based, has fulfilled its intended purpose.



# If schools allowed children to develop their full potential, both technological and personal, there would probably be no reason for nvias to exist

**Pavel König, whom we have interviewed once before, is not just an enthusiast for new technologies. First and foremost, he is the founder of nvias, an organization that brings together motivated creators, professionals, caring parents and promising students. Together, they create fun projects that have the potential to turn young people from consumers to creators. Supporting talent is crucial, not only in the Pilsen region, and we met with Pavel again to discuss this.**

**As you revealed in another interview, your motivation for founding nvias was to prevent your children from becoming passive consumers of technology. nvias has now been running for 7 years. What are your children into today?**

I thought, why not combine business with pleasure? I wanted to specialize in this field, and I wanted to inspire my children and provide them with a space to develop their interests. Our family is just like any other, of course. The younger generation is different than we used to be, and if you try to push them too hard, they have a natural tendency to put up a resistance. I was once like that myself, so I did not delude

myself that my children would be any different and say: “Gee, what a great opportunity Daddy gave us! Let’s take advantage of it.” I know that I am as biased as any parent, but I still think that compared to their peers, they were given some very interesting opportunities. My daughter currently majors in interior design at the Sutnar School of Design and Art, and my son studies international trade at the Nerudovka secondary school. They are trying out their own projects, but school is still a priority for now.

In general, I could say this is true for all the children who have participated in our leisure clubs and who we’ve been following for the past

7 years or so, whether they have moved on from elementary school to high school, from high school to college, or are currently launching their own startups. In the nvias charter, we vowed to create a space to experiment with new technologies and create products and services that have global potential. I believe that our children have been given interesting opportunities and have broadened their horizons. They have been given the opportunity to develop their skills. They know how to sell their skill set, and how to work in a team. Since our budding talents often become mentors in our clubs, they have the chance to develop their leadership skills, and learn how to motivate others.



My first experience with running a club was very interesting because I felt like I was in exactly the same situation as in a company where you need to motivate 20 people; you have 20 children that each want to do their own thing, and you have to bring them together and point them in the same direction, so it's amazing training material. Our mentors and our children have been given opportunities to present and participate in events like Startup Weekend, where they practice their language skills, they get to experience an international setting, or they get involved in some of the projects we did as part of Erasmus. All in all, we provide them with a lot of space, insight, and opportunities.

An all-rounded development is very important, especially for the young generation. I'm glad they're trying out different things: they work with a mentor for a while, then maybe move on to working on a project of their own. The mentors in our clubs often start their own projects and take up the responsibility for them, which means they encounter problems that we have been trying to protect them from, and learn from them. I would say that this project has fulfilled my hopes and expectations, both on larger scale and at the home front. Like in any standard family, however, it would perhaps be better to ask my children that: does the thing that Dad came up with make sense?

**I'd like to go back to my first question. You said you don't want your children to be mere consumers of technology. Seven years ago, there was Twitter, Facebook and Instagram. Aren't you a little worried about, say, Tiktok and how social media is changing people's behavior?**

I see the way social media is having an impact on people's lives and changing patterns of behavior, and I see that in children as well. In our activities with project-based learning elements, such as clubs, project days or summer camps, I have seen how these systems influence the children's expectations. Digital technology and social media are fast and provide instant results

and gratification. It's important to teach children patience and help them learn to overcome any setbacks when completing their projects. However, I have seen the way even a partial success can bring children joy, helping them understand that some things in life take time and that effort and perseverance are key to success.

Although my initial concern was largely about the excessive "consumption" of online games, new social networks like TikTok have proven to be perhaps even more dangerous. What has fundamentally changed is the refinement of artificial intelligence, which has the sole purpose of keeping users engaged with the content provided for as long as possible. This change has made it harder to break away from these systems, because users are constantly rewarded for staying engaged.

**Listening to you, I can't help but wonder whether you've watched Black Mirror. If so, did it scare you that some of those scenarios have more or less already occurred?**

I liked the concept of the personal assistant in a box. I'd like to have that, but I wouldn't want to be the one in the box. In one episode, they made a digital clone of one's consciousness, turned it into an AI and put it in a box. The AI then acted as an assistant. It took a while for it to realize that it was just a servant, only supposed to do what it was told to do. Another interesting episode was the one that focused on social credit, where they rewarded positive activities, which seems fine at first glance. But it only takes a few blunders to get into a precarious situation, and we will be able to observe how things play out in China now. I think every innovation will find its users and justification.

**People can be very mean on social media, though of course the bullying, in and out of school and online, can be terrible too. Since everyone leaves a digital footprint, it's awfully easy to completely destroy a person online. What can we do about it?**

It's an important topic and we are not the only ones thinking about it. The EU has set

*“Imagine that whatever you write to someone on the Internet, you would have say to them to their face. Many people fail to exercise this kind of restraint when they write hateful posts or messages. They fell like they are hidden in some sort of a bubble. It is very similar to people cursing other drivers inside their own car. Once they get out, they are nice, normal people. Netiquette is a skill we need to constantly work on.”*

up DigComp, a competency framework for the digital world. The DigComp Framework is what we are trying to navigate by, and one of those key skills is Netiquette, the rules of decent behavior in virtual and digital space. Many people on social media fail to respect the very first point of those rules: Imagine that whatever you write to someone on the Internet, you would have say to them to their face. Many people fail to exercise this kind of restraint when they write hateful posts or messages. They fell like they are hidden in some sort of a bubble. It is very similar to people cursing other drivers inside their own car. Once they get out, they are nice, normal people. Netiquette is a skill we need to constantly work on.

**Let us now introduce nvias. Tell us what you do.**

To sum it up briefly, our organization has two important branches. We focus on leisure education, which we run under the Bridge Academy banner. We are trying to create a comprehensive educational portal where children and young people can develop in different areas. We are trying to piece together a whole learning journey, starting with Minecraft and moving up to programming games in Roblox, Blender, Unity, AI, and a number of other areas where kids can develop further. These are both offline and online activities where participants not only learn how to work with various tools, like programming games or creating projects in Minecraft,





but they also learn important competences for communication in the virtual world, which, if they are interested in working for technology companies, are extremely important. Take digital nomadism, for example. A colleague of mine is now in Switzerland, but continues to work as usual and enjoys his free time in a completely different place. That's what the digital world allows us to do. We develop these online competencies as part of leisure education.

The second branch is school programs, where we try to offer schools long-term cooperation involving three simple steps. The first step is usually some kind of a game-based experience, and motivating the children by opening up different topics. The second step is to provide training and coaching for the teachers so that the topic can be developed more in class. The third step is to motivate students and students to do a project of their own that can have some kind of an impact on their environment. They can try to change the school environment or the neighborhood where they live, or tackle some other issue that they are concerned about, and come up with a solution using the skills they have learned. The topics we offer are related to technology, entrepreneurship, and sustainability. Technology is covered through Minecraft as part of the AI Discovery or IOT project days. For sustainability, we have a Climate Rules project day, which is an amazing, very complex simulation game that simulates how technology will affect our planet 100 years into the future. Entrepreneurship is a part of our company's project day, which focuses on technology as such, while also connecting it to business strategy. We teach children how to navigate the market, and how companies create added value. The investment game demonstrates that when a company invests massively in its own research and development, it creates interesting added value just as much as with good marketing and sales. Production is key. It is the foundation on which to build, but it needs the other areas to generate the right added value. These are the areas that we introduce at schools and motivate students to create their own projects.

### **You also work with the Smart Accelerator for the Pilsen Region III on projects aimed at supporting talent and building a community of gifted students, is that right?**

We are in contact with Eva Rojíková, Manager of Talent Community Building for the RDI Information System within the Smart Accelerator project, in order to define where our work would best intersect. We have currently finalized a project supported by the Talent Fund of the Ministry of Education. The project is called nvias Space for Talents, and it develops exactly those competencies we have already talked about. The project involves such eminent experts as Jan Švec from NTIS, who focuses on artificial intelligence and technology; Jiří Švihla, who specializes in IoT technologies; we also work with biologist Zdeňka Chocholoušková, who introduces students to the topic of sustainability and demonstrates areas where technology draws inspiration from nature. Dagmar Prášková focuses on circular economy. We have great experts who have helped students to develop their skills. We have also worked on personal development, which is the domain of our psychologist Niky Čechů, who has led workshops on teamwork and awareness of one's own strengths. This has been a very valuable project that we have been able to spread among gifted students in the GoHigher community through the Smart Accelerator project. They are the ones who track and bring together gifted students in the region.

The next program we are planning is based on our experience in connecting businesses with high school students, whether it's through projects or field trips. We try to work very closely with businesses, and we are also dependent on their funding: a lot of the events we organize are financially supported by various companies. This program is aimed at a group of motivated students from the GoHigher community, and involves a field trip combined with a project day focused on entrepreneurship and artificial intelligence. The field trip should take place at the Biomedical Center of the Faculty of Medicine of Charles University in Pilsen. Students will be able to gain new experience and information during the field trip. The project day will offer

them the opportunity to learn about artificial intelligence and offer their own ideas for its utilization in biomedicine.

**Do you ever miss the hustle and bustle of business at AIMTEC, where you used to work?**

Well, even seven years later I sometimes pick up the phone and have to stop myself so I won't introduce myself as an AIMTEC member. There are many amazing people there that I still meet with and work on projects together.

Perhaps this is another family-related question. A non-profit organization is different from a regular business in that it doesn't have financial gain as a priority. At AIMTEC, the financial options were more stable and secure. A non-profit education organization operates on different principles, which brings great challenges, especially in terms of planning and running the organization.

The IT business that AIMTEC specializes in is also fraught with challenges and fluctuations. It is never easy and requires one to put in constant effort to provide quality services to customers. The two businesses, despite their differences, require a similar approach to address strategic challenges. For example, a situation where strategic solutions are implemented across an entire corporation would be similar to changing an entire education system in a city.

We need to negotiate with many parties in education, including the city hall, regional governments, local businesses, and action groups. To make the whole ecosystem work as a whole, we need to secure joint funding and support, not only financial but also professional. In Pilsen, this works very well, especially thanks to the support of the Information Technology Administration and their SIT Port project. The city refers to the whole innovation ecosystem as PINE.

Although I sometimes miss the atmosphere and the people at AIMTEC, what we do at nvias is full of inspiration and new challenges, so there is no room for nostalgia. I find it especially rewarding to be in constant contact with young people and their energy and lack of experience, which brings unique challenges but also provides a lot of inspiration and interesting ideas.

**Can you think of an instance when you said to yourself that it was for these moments that it made sense to start nvias?**

Something happens to remind me every day, which is great. I have always been able to appreciate when little things finally form a beautiful whole. It would be hard to single out any particular thing. I was really excited when some five children from one of our clubs for kids aged 8-12 presented their Minecraft projects at Future Port Prague in English in front of an audience of 200 people. That

was such a big moment for me; I'm not sure that anything has topped it since. But those bits and pieces are really enough for me. Like the kids from our summer Minecraft camps coming back to tell us that they realize how much they helped them. When you watch them grow, and watch them being with us for three consecutive years, watch them present and work as a team, that's really satisfying. You can see a huge progress there. It also brings me a great joy to simply inspire someone, who later comes back to us to tell us that we showed them the way to introduce AI to children, to help them not be afraid of it and successfully utilize it in teaching. It makes me extremely happy to watch our students create a virtual world or shoot 360-degree virtual reality videos, which was part of the Social Impact of ClimAte Rules project in Prague, and then they take the virtual sets to a retirement home and show it to the seniors, and the grandmas and grandpas there are just blown away. I remember one lady telling them: "Girls, this is better than embroidery!"

The end of the year 2023 was really exceptional: we saw the final stage of Future Workforce Show project, where elementary and high school students stepped on TechTower's stage for the first time to present their projects, as well as the final show of nvias Space for Talents in Prague at the CIIRC CTU. These are the moments I find extremely fulfilling.

I've also been thinking about the question from the other angle, now that we are embarking on

*“The younger generation is different than we used to be, and if you try to push them too hard, they have a natural tendency to put up a resistance.”*





some more strategic projects aimed at influencing the situation in various regions. People often say that the role of non-profits is to cover a segment where the state or system as a whole is not working. It is true that if certain things worked as they should, there would have been no reason to start nvias to fill in. If schools provided an inspiring, fun way of learning that facilitates all-round development of children, both on technological and personal level, there would probably be no reason to start nvias. And we would have fun exploring some other field.

**Isn't school by its very nature always going to be a bit tedious?**

I would say that people who go down the “learning through play” route and enjoy creating, learning and pushing themselves to improve need a lot of courage to break away from the traditional methods. If you decide to teach the same way it's been done for fifty years, or I don't know how long, no one can say anything, you're not doing anything wrong, just doing what's been tried and tested. We've all been through this system and in the end we can all make a living and live happy lives.

On the other hand, we do see a lot of examples of good practice, where learning is approached in a playful, creative and open way, and the results are absolutely incredible. Take for example the IB program (International Baccalaureate Diploma Program) at Rokycany High School. When we came to introduce our Climate Rules program, our jaws really dropped when we saw how enthusiastic the students were about it, how they were able to argue and negotiate. The IB program is designed for motivated students who show interest and are willing to put in the work, which means that the results are spectacular and I believe this is the way to go. There are of course other schools that have tried to step out of their comfort zone and try alternative ways of teaching. They let students do projects and believe that in doing so they are actually accomplishing what the ministry is asking them to do. Today's schools evaluate children purely on their ability to learn by rote and regurgitate dates, geography and math facts, chemical formulas, etc. However, when our HYDRA team was trying to improve car consumption, battery and hydrogen consumption, they figured that the best way to approach the problem would be

to compute the integral of total consumption during a race. In the end, those high school students were learning stuff they would otherwise only learn in college. If student projects are well set up, students are well motivated and receive proper guidance, they can still learn everything that is in the required curriculum. They may miss minor details but I believe they can read up on those to understand the context at any time. Alternative approaches are possible, which is great.

We would like to integrate our programs into all schools that are not afraid of trying out something new. Perhaps we should redefine our end goal as the point at which we can shut nvias down, because our mission – to provide schools with extensive, play-based educational content that is fun and engaging and allows children to create their own projects, present their ideas, and obtain support from businesses – has been fulfilled. Once schools have the resources and motivation to make this system sustainable, we can consider our mission accomplished.

**Can you imagine at this point that this might actually occur any time soon?**

When I look at what's currently going on, not only at nvias, but across the entire education system, I always try to point out things that have been successfully accomplished. There have been a number of projects that have helped set up and sustain the new system, whether it's promoting entrepreneurship or working with technology as such. We have seen an increased interest both from the public and corporations. There's still a huge amount of work to be done, and we're still only working with a small number of schools with enlightened management and motivated teachers, which in turn attract motivated children and parents. We are working with a very limited sample of schools, and there is still a huge amount of work to be done... Five years is a relatively short time. I think it's going to take something like 8 to 10 years. Once a generational shift occurs at some schools, it may turn out that what we're doing now is no longer necessary. So 10 years is probably a good estimate.

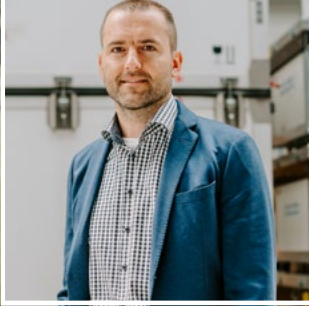
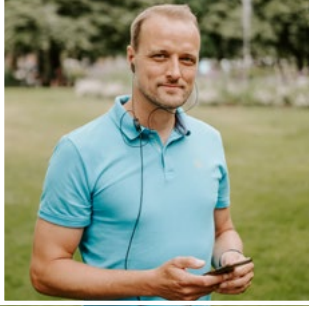
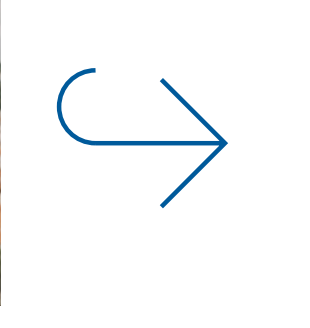
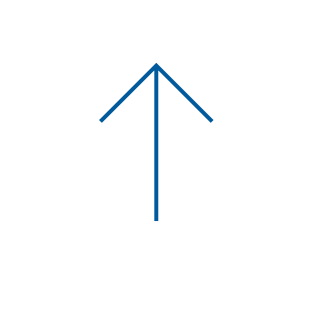
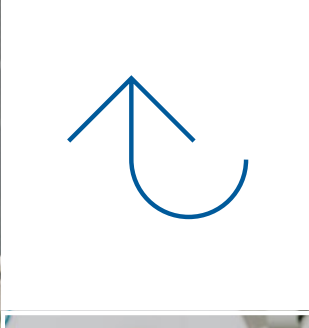
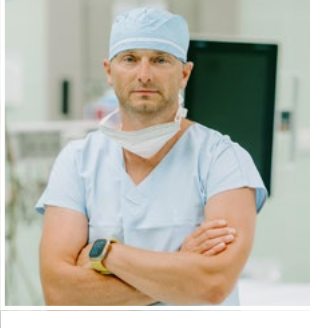
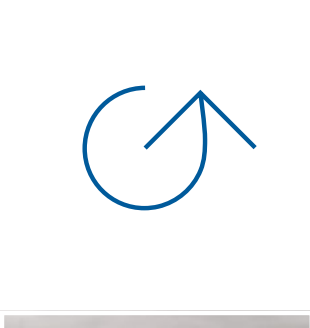
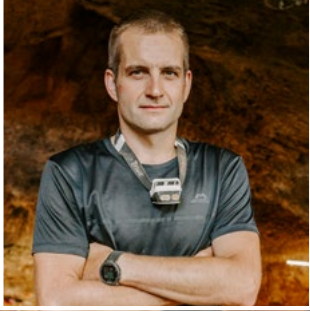
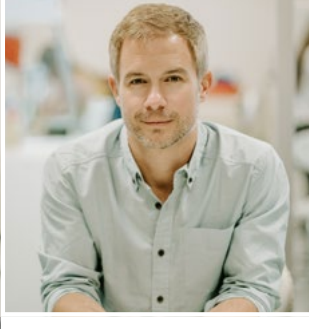
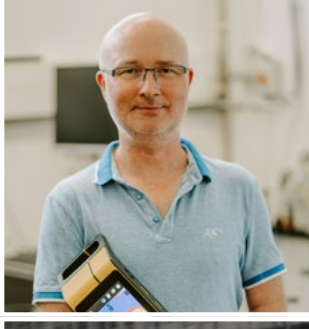
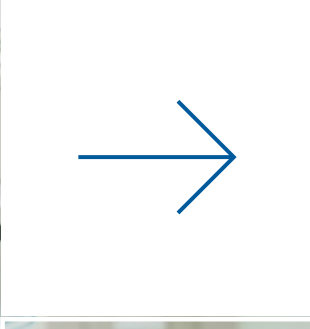
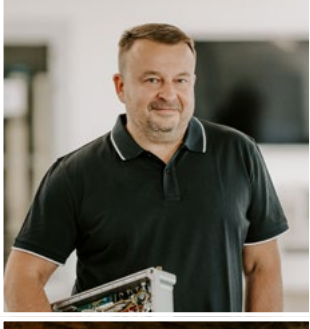


# Innovation: The DNA of the Pilsen Region

Eighteen inspiring people, their life stories and scientific projects to which they devote all their energy and talent in order to broaden our knowledge were presented in Šafařík Park in Pilsen and in Hostaš Park in Klatovy last September, as part of a large-format exhibition of the same name. The common denominator is the Pilsen region, the place with which they have linked their professional and personal lives.

Thanks to the travelling exhibition, which was also on display at the 2023 Intelligent Specialization of the Region conference at the Vienna House Pilsen hotel in October and during the AI Days at the TechTower science and technology park in

Plzeň-Slovany, visitors could get to know, for example, a machine learning engineer who specializes in infrared technology; a paleoanthropologist; a materials engineer; an XR consultant; a computational scientist from ŠKODA JS; a scientist; a startup founder; head of the Surgical Clinic at the University Hospital in Pilsen; or the head of the Advanced Materials Research Team at the New Technologies Research Center (NTC) of the University of West Bohemia in Pilsen. The exhibition demonstrated that not only is the Pilsen region full of interesting, inspiring personalities, but that apart from the dedication to their profession, they are real people with families and hobbies.



# 2023 Smart Specialization in the Region Conference in Pictures



At the beginning of October, the fourth Smart Specialization in the Region conference was held under the title “The importance of accelerating development and cooperation in research, development and innovation in the Pilsen Region,” discussing new forms of cooperation between businesses and research organizations, as well as the search for opportunities to obtain support for such cooperation from the regional public administration. This year’s event was attended by more than 130 experts, academics, representatives of the commercial and public sphere, stakeholders and the general public who are invested in the future of the Pilsen Region, not only in the field of research, development and innovation, but also in education, higher education, and economic development.

The morning sessions focused on the functioning of regional innovation systems and practical experiences from other regions. Speakers included Pavel Mertlík, economist and president of ŠKODA AUTO University; Professor Jiří Blažek, Head of the Department of Social Geography and Regional Development at the Faculty of Science of Charles University; and David Uhlíř, Director of Strategy at the South Moravian Innovation Center (JIC). In the subsequent panel discussion followed, the morning speakers were joined by Martin Wichterle, CEO of Wikov Industry and the Rückl and BOMMA glassworks; Miroslav Lávička, Rector of the University of West Bohemia in Pilsen; Jindřich Fínek, Dean of the Faculty of Medicine of Charles University in Pilsen; Libor

Kraus, Chairman of the Regional Council for Research, Development and Innovation of the Pilsen Region and Chairman of the Board of Directors of COMTES FHT a.s.; and the Regional RIS3 Manager, Milan Edl. Four parallel workshops were held in the afternoon: *Cooperation between research organizations and companies: How to utilize knowledge and technology from research organizations to improve competitiveness of businesses; Startups: How to support the development of startups in the Pilsen Region; Talent support: How to further develop the talent support system in the Pilsen Region? How can RDI strengthen the Pilsen Region brand and what role does the media play?*



# Few places in the country have such a concentration of companies capable of manufacturing components for energy equipment

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Modern power engineering through the eyes of professional developer Jan Naxera, consultant in the field of regional economic development and regional RIS3 developer

**Modern energy is one of the five specializations of the Pilsen Region. It has been added to the "original" four specializations relatively recently. Why is that?**

The topic of modern energy had already been identified as a potential domain of specialization during the analysis of suitable fields for the RIS3 strategy and smart specialization. It was only last year, however, that we registered interest in exploring this area further, and at the same time managed to obtain the necessary support for this domain from important regional entities.

**Does this mean that other domains – Smart Mobility, New Materials and Technologies, Smart Manufacturing Systems and Biomedicine and Technology in Healthcare – have already managed to obtain such support?**

Yes, these domains of specialization were formulated about five years ago, based on an analysis and subsequent discussion and agreement by several stakeholders. These domains are underpinned by research and development capacities and there are actors who can put the knowledge into practice. We had come across the topic of modern energy earlier, but it was not until 2022, when the constitutive meeting of the eponymous platform took place, that we were able to formalize this topic into a domain of specialization in the RIS3 strategy. There were several reasons for adding a fifth domain of specialization, but one stands out in particular: the energy crisis we experienced and are still experiencing today, as well as the challenges arising from the push for a higher share of renewable energy. Furthermore, the topic of energy and energy sector was discussed in the course of the completion and presentation of the Analysis

of Global Megatrends and Societal Challenges: Opportunities and Risks for the Pilsen Region. The results presented and discussed at last year's Smart Specialization Conference revealed the need to add the domain of specialization focused on energy.

**The Modern Energy domain builds on the significant capacities of research organizations in the region as well as on corporate research and development. Can you be more specific?**

This mainly includes the capacities of UWB and companies in the field of power engineering and electrical engineering affiliated with ŠKODA Plzeň – specifically Doosan ŠKODA Power, ŠKODA Energo, ETD Transformátory, Brush SEM, and others. In addition to these "traditional"





capacities, there are also other entities implementing activities focused, for example, on the use of renewable resources. Few places in the country have such a concentration of companies capable of manufacturing components for energy equipment.

**You mentioned companies that specialize in the utilization of renewable resources. What do these activities and/or projects entail?**

We are talking, for example, about companies that deal with energy storage. Pinflow develops and manufactures batteries with liquid electrolyte (redox flow technology). Energy Cloud produces control and power electronic devices and has long been involved in the research and development of battery-based energy management. Even large

companies such as Doosan ŠKODA Power are currently working on the development and production of equipment for biomass, solar energy, or waste heat recovery.

**Is it true that these companies have the chance to meet with providers of the "traditional" capacities at the meetings of the Regional Innovation Platform, which provide an opportunity to establish cooperation, to talk about the issues the companies are facing, and areas for improvement? Or, given the size of the region, is it possible that they already do meet and know each other?**

Although the members of this innovation platform include entities that have known each other and worked together for a long time, there are still many things worth discussing, and new challenges that come with the changing times, such as the use of renewable energy in the energy sector. At the same time, we generally try to invite representatives of newly emerging companies to regional innovation platforms, so that they can introduce themselves and gain contacts or discuss possibilities of cooperation with other entities. We also invite representatives of the public sector and supporting organizations that can play an active role in proposing or preparing cooperation projects.

**What are the objectives of the Regional Innovation Platform?**

The initial meeting of this platform was to define a common goal and specify preferred and promising directions. Together with other stakeholders, we concluded that the common goal of the platform – as a facilitator of interdisciplinary collaboration in research, development and innovation – is to promote activities that will ensure affordable energy sources for the future, thanks to a reliable, flexible, low-emission and sustainable energy sector. In addition, there was a discussion on preferred future directions, which include, for example, energy networks, renewable energy sources, district heating and cogeneration, energy storage, energy digitalization, and regional and

community energy issues. At a follow-up meeting of the platform in May 2023, Doosan Škoda Power presented their research and development activities in view of the current trends in the energy sector. Other intersectional topics were also discussed, such the issue of training specialists at various levels. An integral part of the functioning of the Regional Innovation Platform is also the information link to the National Innovation Platforms: RIP representatives are involved outlining Czechia's research and development priorities, and conversely, general NIP topics are being presented at the meetings of the Regional Innovation Platform – meaning, other topics besides the Modern Energy domain.

**The domain topic intersects with all sectors of the economy and is linked to other domains of specialization in research, development and innovation of the Pilsen Region. Does this mean that RIP Modern Energy brings together experts from the public, research and private sectors across disciplines and the other four domains of specialization?**

Together with other fellow developers and stakeholders, we try to look for topics that are intersectional, not just energy-related: areas such as digitalization, security, artificial intelligence, sustainability of production. The latter, for example, is directly linked to the mission of Improving the Material, Energy and Emissions Efficiency of the Economy, formulated based on the priorities of the national RIS3 strategy.

**An essential part of developing a modern energy industry is the training of experts for future activities in all topics of the Modern Energy domain. Which fields in the region does this entail?**

This is going to be quite a challenge, since fewer and fewer students are studying (at FEL) fields focused on "traditional" energy. I would rather leave the answer to our expert guarantor, Professor Peroutka; I am interested in his ideas how to reverse this trend and how to support these fields in the future.

# I am convinced that Pilsen is Czechia's mecca of energy industry and transport, and I am proud of it

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Modern energy industry through the eyes of expert guarantor  
prof. Ing. Zdeněk Peroutka, Ph.D., Dean of the Faculty of Electrical  
Engineering of the University of West Bohemia in Pilsen and  
Director of the Research and Innovation Center for Electrical  
Engineering (RICE)

**The Pilsen region has a long tradition in the field of energy engineering, power electrical engineering, the development of control and regulation systems, and in other areas related to energy safety or energy production and distribution in general. Compared to other regions in the country, is our region really so exceptional in this respect?**

I believe we are exceptional, for three reasons. The first reason is our strong regional industry. Pilsen has always been an industrial mecca in both energy and transport technologies. We have manufacturing companies capable to manufacture exclusive equipment for the most complex power production and supply facilities, such as nuclear or conventional power plants.

We have excellent companies capable of supplying new technologies for the power grid, which is another vast area. We have a thriving industry that employs a large number of people and has a long tradition in the energy sector. The second reason we have such a strong, successful industry is the support it has in university teams. UWB conducts outstanding research and development in energy engineering, and in many disciplines, we have the best results in the country. We play a significant role in all strategic national energy projects, such as the National Center for Energy (NCE), which is funded through the Czech Technology Agency. Another national center focusing on energy is the Center for Advanced Nuclear Technologies (CANUT) which has been

long based in Pilsen. The third national center that focuses on hydrogen and has an overlap with the energy sector is the NAHYC Hydrogen Center, where the University of West Bohemia also plays a very important role. We are involved in all these major research activities. There has always been a close link between technical education, university research teams, and industry in Pilsen, which makes Pilsen very unique compared to the rest of the country.

The third reason is our student population. Students often go to UWB to major in energy engineering, and I am convinced that it is our reputation in this area that attracts students not only from the Pilsen region but from other parts of the country as well.

**An essential condition for the development of modern energy industry is the emphasis on the education of future professionals. With the planned construction of nuclear power plants, tens of thousands of them will be needed in Europe alone. However, only a small number of students major in “traditional” energy engineering at FEL. Do you think this trend could be reversed by making it certain that such projects will actually happen and that this topic will be more publicized?**

First of all, we need to distinguish between nuclear and non-nuclear energy. What you are referring to concerns first and foremost nuclear energy. In my opinion, nuclear energy is the only sustainable way for Czechia to be energy self-sufficient and to ensure a sufficient level of national security. I am not saying that centralized nuclear power sources are the only possible solution: micro-reactors and small modular reactors are certainly an interesting alternative. It’s a matter of working out a sensible mix between these technologies. This should clearly be the basis of the energy sector, and nuclear energy in any form should be Czechia’s key source of electric power.

The public’s interest in the Dukovany tender, together with Czechia’s massive campaign to declare nuclear power as its key source of energy, should definitely appeal to students. We have already seen a significant increase in interest in our study programs, with a growing number of students choosing majors focusing specifically on nuclear energy, so we are already seeing a positive trend, before the Dukovany project has even started. In non-nuclear energy, the situation is slightly different. The increase in student numbers is not as significant, although we are seeing an improvement in this area as well. The key areas in this respect include decarbonizing our resources and technologies, and new power grids, both for transmission and distribution. We focus on these areas both as part of our R&D activities and within our study programs. Although we have seen an increased student interest, it has been lower than we would like, and we are taking steps to offer attractive programs in this area. I attended a top-50 meeting in Arlington, D.C., in the spring, a conference of 50 scientists from three continents – Europe, Asia,



and the US. I had the honor of being one of the invited representatives from Europe, and many of those present expressed their admiration of the way we have managed to link the field of conventional energy with new technological trends. Power electronics, for example, brings completely new possibilities, both in terms of power flow control or new elements in power grids. We have managed to incorporate this connection into a joint study program, and it made me very happy to see representatives from such institutions as ETH Zurich, Virginia Tech or TU Delft consider

the same approach and envying us for having this program for four years already. We try to offer our students the best possible conditions. We are aware that these are attractive fields, we are committed to improving the study programs even further, and I am convinced this will be reflected in growing student numbers. We have perhaps been slightly neglectful in failing to emphasize the importance of these technologies for the environment, because the technologies our students can explore have a major impact on our planet’s long-term sustainability, and they are important

for Czechia's sustainability on both energy and economic level. They have major implications for the protection of the environment, because modern energy engineering and modern power grids help to protect the environment. Obviously, electricity is the cleanest source of energy that we can use today, and the most transportable. Getting an electron traveling at the speed of light across a long distance is an amazing thing, and it is certainly faster than transporting gas or hydrogen by tankers.

This is certainly something that needs to be communicated well, and I believe that young people in secondary schools are already very aware of this. Surveys show that young people feel immense responsibility for the planet's sustainability, and environmental protection is very important to them. I believe that decarbonizing the energy sector and nuclear energy are topics that should be communicated to the public in a much more engaging manner. I believe that this will result in an increased interest from students. Renewable energy is an equally important topic. So many people are installing solar panels on their roofs these days, to have their own source of electricity. I am a big proponent of community energy, that is, giving citizens or action groups/communities the chance to be as energy-independent as possible, and thus economically significant. I can imagine communities down to perhaps the municipal level. that

is, a neighborhood, even a village, which can then become a significant player in the electricity market. It may have completely different conditions in terms of what it contracts for and completely different conditions in terms of how to live and how much money to live on in that municipality. I believe this is the way to go.

**The overall goal is to provide affordable energy through reliable, flexible, low-emission, sustainable energy industry. How is Czechia doing in this respect? Is it even possible to provide affordable, reliable, flexible, low-emission and sustainable energy, or is it simply a desirable but difficult-to-attain goal?**

I believe it is possible, and it will depend on what the energy mix looks like. It will also depend on prudent investments through CEZ Group, in which the government is a majority shareholder and therefore has the power to influence the behavior of other entities on the market. If you are asking whether we can find a way to keep electricity prices at an affordable or at least at a reasonable level, I would say that we can. And I believe that this is a necessary, albeit not the only condition for Czechia to prosper in the long term. The mix we are currently trying to achieve now is based primarily on nuclear energy, supplemented to renewable resources to a reasonable extent – solar, wind,

hydro, and possibly other technologies. We are capable to to put the energy mix together in such a way that electricity is reasonably priced. There are always two sides to every coin, and it is pointless to increase the output of resources indefinitely – we should focus at energy savings as well. We need to find a sensible combination of energy-saving measures and an efficient, effective use of energy. We are capable of building reliable sources of electricity. In terms of investment costs and the resulting price of electricity, this depends very much on what kind of sources they are. We will have to get used to the fact that energy prices will change rapidly and very significantly over time, even for the end customer. By increasing the share of renewable energy, we may get into a situation where the price of electricity may be negative, which may seem somewhat absurd to the average person. This year was actually the first time this has happened in the spot market. This can obviously happen in the summer months, when there are significant surpluses of electricity, particularly from solar sources, the volume of which has increased significantly. It is extremely important that we are able to handle the surpluses and large fluctuations in electricity in general. We are trying to come up with technologies to store electricity, to level out significant imbalances between electricity production and consumption at any given moment. This will be an important key to ensuring that the price of electricity follows a “reasonable” trend over time, not only in terms of years, but also throughout the year, or even in the course of a single day. We need to get used to the fact that electricity prices will vary over the seasons and people will want to optimize their electricity costs throughout the year. I am optimistic in this respect and believe this will actually be possible.

There is one more issue we should mention, namely surplus electricity and the possibility of storing it using hydrogen, which I think is one of the possible uses of hydrogen that make sense. Hydrogen has been a much-discussed medium. It has some interesting properties, but also a lot of disadvantages, and I think that the possibility of electricity storage in hydrogen at times of significant surpluses in the grid, or optimizing the output of nuclear power stations so that they



operate at maximum efficiency, ideally without significant changes in their load, is one of the possible technical solutions.

**Within the framework of the Modern Energy Smart Specialization, there have already been several meetings of the Regional Innovation Platform, allowing the major players in the field, whether research organizations or the private sector, to establish cooperation, to talk about what concerns the companies concerned, what needs to be worked on. Do you think such meetings serve their purpose?**

These events are important, for several reasons. They allow us to communicate and have in-depth discussions about the problems that we currently find most pressing. And such meetings do have specific outcomes, of course: new projects, new ideas, new products and original technical solutions that our industrial partners are successfully commercializing. The platform's events have garnered great interest from industrial partners (generally the application sphere), university teams and other research entities in the region. Our teams regularly present the new technologies we are working on at platform meetings. We let our partners take a sneak peek at whatever we are currently tinkering with in our labs, which allows them to consider various possible ways of putting our ideas to commercial use. At the same time, our partners provide us with tips for future research, describing the technical problems they currently struggle with. Personal networking is another benefit of the platform: for the two-way transfer of information and technology to work as intended, we need to know and trust each other. It is always good to know who to call when you have a problem.

**At the Regional Innovation Platforms and other meetings or conferences in the region, we can often hear voices complaining how hard it is to find new talents, since there are not enough graduates in STEM fields.**

I recently read an analysis showing how many electrical engineers are currently needed in Europe

and in Czechia. If I remember correctly, Czechia is going to need 12,000 new electrical engineers in the next five years, which is fantastic news for prospective students, since it will be easy for them to find well-paying jobs. During its entire existence, the Pilsen Faculty of Electrical Engineering, which is one of the oldest educational institutions in Czechia in this field, has produced roughly 12,000 graduates. This means from 1949 until today we have educated as many electrical engineers as Czechia will need to produce within the next five years. We try to have as many students as possible, boosting their numbers with foreign students, since Czechia simply does not have enough high school graduates to meet the needs of regional industry. We are trying to increase our numbers however we can, but there is no way we can produce 12,000 graduates in 5 years. In Belgium, for example, the number is around 15,000, and in Germany the numbers will be even higher. These are incredible numbers that electrical engineering schools are not able to meet. We are trying, but we are nowhere near. On the other hand, it is great news for our graduates. Companies will be vying for them, which means they can be sure to find stable, high-paying jobs. Anyone who is interested in a field with excellent job security and high pay should consider electrical engineering.

**Isn't there more money flowing into science and research overall from the private sector? David Uhlíř from the South Moravian Innovation Center mentioned at our 2023 Smart Specialization of the Region conference that there are several large Czech companies with foreign outreach that have funded innovation themselves.**

David Uhlíř and I have known each other for a long time, from back when projects were launched under the Research and Development for Innovation Operational Program. At that time, we were building our RICE research center, which is one of the few from that era that is still operating and has the potential to continue to operate successfully for many years to come. As far as corporate funding of research and development is concerned, businesses have very

limited budgets for R&D, which they divide between projects that are purely privately funded and those that are co-funded by public sources (typically through grants, etc.). Public resources available for R&D co-financing have been fairly substantial in the past decade, and therefore a significant part of companies' R&D budgets have been utilized for projects co-financed by public sources. The reasons for this are clear: such projects are cost-effective and they minimize the investor's risks. Purely privately funded projects therefore focused primarily on the creation of strategic know-how, or technologies with a short time-to-market, with the aim of a quick return on investment. On the other hand, top-ranking, economically strong companies often become involved in our joint research programs, focusing on long-range projects that mainly involve cutting-edge technologies which require sufficient time to develop. These projects typically demonstrate the possibilities of utilizing new technologies, usually pushing the limits of what is possible in physics or chemistry. These are typically 6- to 8-year projects funded purely by corporate investors. This is indeed a very important and valuable contribution to our budget.

I think that the Czech Republic has made very reasonable investments in R&D in the last decade. It is important that we continue to invest on a large scale, and that we systematically increase investment in quality research and development and in new technologies. However, we should not forget to invest significantly in education, because all strategic technological investments will only be meaningful if we have educated people who are smart and experienced enough to develop or use the technologies. I would like to appeal to our government to continue to provide sufficient funding to the education system and to universities, which are of course making significant efforts to generate and obtain sufficient funding on their own. However, they have been running out of steam. I think the government should provide them a "refreshment break" so that they can have a moment of peace and sustenance, nurse their wounds and regain their strength to continue the long journey that is still ahead of them.

# The crisis is forcing people to seek new paths, to unite and work together

**Dr. David Uhlíř, Deputy Director for Strategy at JIC with many years of experience in the development of innovation ecosystems, including the environment for innovative startups, shared his experience with developing the innovation ecosystem in the South Moravian Region at our 2023 Smart Specialization of the Region conference in October.**

*I think it is important to distinguish between research and innovation, they are not the same thing.*

**First of all I would like to ask what are your impressions of the conference. Was there anything that stuck in your mind, or something you wanted to respond to but did not have the time?**

There were a lot of things. One of the things that stuck out for me was the city's image. I have not been to Pilsen in twenty-five years, and I have a very good feeling about the way it looks and feels now. However, I have also heard it said that people have a rather negative perception of the town, that Pilsen is not an attractive place for foreigners.

**I had the opposite feeling. I noticed many positive comments from the panelists who were from Pilsen; one of them used the exaggerated term "Pilsner fascist" to**

**express that he was a proud Pilsener. What did you think of that?**

This somewhat over-the-top comment was made by Mr. Wichterle, who is not actually a Pilsener, and he talked about the need to improve the city's image, which I find kind of interesting, because I have always felt that Pilsen already has a good image, so I believe there is definitely something to build on here. I also found the debate on priorities interesting. Miroslav Lávička, Rector of the University of West Bohemia in Pilsen, talked about the need to find one's niche and to differentiate oneself, which I think is exactly how specialization should work. At the same time, I didn't feel that the priorities that the region had set out really reflected this mindset. I felt that if we were to define Czech national priorities, they would have been exactly the same.

**I was intrigued by your reaction that you thought five specializations was too many. Could you comment more on that?**

Yes, it seems a lot to me. If you want to make a difference in any of them, it would require an awful lot of work and resources. And a region that has a population of 600,000 people with the budget that it currently has, is going to have its work cut out even if it wants to make difference in just one or two areas.

**So it's mainly a question of funding?**

Funding is one of the things, but critical mass is also crucial. I feel some of those are topics better suitable for a national debate, to which Pilsen can contribute, but they are not areas in which it can make a difference in on its own as a region without nationwide cooperation.



*In 2002, South Moravia was a region with severe unemployment, which reached as high as 12 percent in Brno alone. Today, South Moravia has the highest concentration of business R&D departments, with 459 of them located in the region. 7.3 % of the region's population is employed in high-tech industries and the South Moravian Innovation Center can boast a number of successes in its twenty-year history.*

**Quantum materials are very much on the agenda in Pilsen at the moment, do you think this is an area to focus on?**

I think smart specialization is about innovation and business. These are things that are terribly interesting from a research point of view, and maybe they will find some practical applications in time, but it is a long journey that will require huge resources and international cooperation. In my opinion, it makes absolutely no sense to build a regional innovation strategy around it. On a technology readiness level, it has a very long way to go before it can be commercially utilized in any way. I think it is important to distinguish between research and innovation, they are not the same thing. From the debate at the conference, I felt that many people were confusing the two. Research funding and innovation funding were mentioned as if they were interchangeable. Most innovations in the really technologically advanced companies in Czechia happen without any public support. For example, companies like Avast have not received a single crown of public funding for research and development in all the years of their existence; not a single grant.

And this is a Czech unicorn, a globally successful and technologically very advanced company. The leading Czech biotech firm Sotio also finances their own development. I think that the debate is still very much focused on government money, which is actually a relatively small share of the funds spent on innovation in this country, and I think that is a bit of a shame. We should be discussing possible sophisticated regulations the government can use to, say, multiply the amount of venture capital investment that could flow into these companies for innovative projects. Since we do not have anything like that available, people are putting their money into real estate instead and inflating real estate bubbles. These are discussions that I think are very much relevant to innovation policy. Quantum materials are fine, but this area is still very much on basic research level in Czechia, nowhere near business and innovation.

**JIC representatives mentioned that "in order for Brno not to be just a provincial backwater where nothing is happening, they decided to**

**set up JIC and put their money on innovation, science and research." Would you agree that it was something you simply had to do, perhaps simply to distinguish yourselves against Prague, which Brno is always being compared to?**

I don't really like the constant comparing with Prague. I find it rather unnecessary. The economic problems in our region were so huge at the time that people simply sat down and decided that something had to be done about it, which I think is normal and natural. I personally believe that we need to learn to cooperate more in this country rather constantly compete with one another. I found the Governor's remarks in his opening speech regarding the huge amount of money Brno has swallowed up a little unfortunate. I think that it's mixing apples and oranges, because the money went into research infrastructure. Research infrastructure is not innovation. These investments had a certain indirect effect on the innovation and business environment, but it was relatively limited, just as in Pilsen, where more money was invested per number of researchers than in Brno. However, these investments from the Structural Funds are simply a breeding ground for the education and growth of talent, which may or may not translate into innovation and entrepreneurial success in the form of the creation and growth of innovative companies.

**You said that people in Brno decided they had a problem and had to do something about it. At this conference, participants from Pilsen often claimed that the region has an excellent milieu for innovation. Isn't it actually better not to be too happy with the current state of affairs?**

If you look around the world, you'll see that many advanced innovation ecosystems can be found in places where there was a big economic crisis at some point, and that was often an accelerator for change, finding a new trajectory. Take Eindhoven, for example: something similar happened there in the early 1990s, when Philips almost went bankrupt. We could find quite a few of such regional examples. I think there is something to it. A crisis

**Dr. David Uhlíř graduated from the Open University in Milton Keynes, UK, with a PhD in Geography and from the Faculty of Science at Charles University in Prague with a master's degree in social Geography. He is involved in the regional innovation strategy of the South Moravian Region, helping to facilitate the creation of new projects and initiatives to promote innovation, connect the various players within the local innovation ecosystem, and provide inspiration for its further development. He contributed to the establishment of the Regional Information Service (RIS) in South Moravia in 2002–2003, which included a regional agreement on the establishment of JIC. He has also been involved in a number of innovation and research policy consulting projects, both in Czechia and abroad.**

forces people to look for new strategies, to come together and cooperate. It's no coincidence that ironically, most of the capital cities in Europe don't have a very advanced innovation ecosystem. There may be a lot going on – and I'm not talking just about Prague now. When I talked about this with colleagues from our European association, they said that it is a really common pattern: second- or third-largest cities are often the interesting ones. They have to try harder to make things happen, but they have often undergone some kind of crisis. Capital cities are usually fine no matter what. Prague will always attract tourists, it's the headquarters of multinational companies. Capitals simply have a natural attraction, they pull in talent no matter what, so you don't have to try that hard and the economy more or less works. But cities that have gone through a deep crisis, like the Ostrava region has once done, or as Ústí nad Labem is going through today, you have a stronger motivation to improve. There are interesting things happening there now, and it all stems from the necessity to solve pressing problems.

**Thinking back on the Czechia at a Crossroads conference, it occurred to me that the entire**

**country is now in a similar situation, and perhaps we should ask ourselves how we can reverse the currently rather unfavorable economic trend.**

I think there is something to it. We had a visit from President Pavel last week, and that's exactly what we talked about. He told us he would like to set up a group that would help formulate a more long-term vision for the Czech Republic, one that would be non-partisan and would span more than one electoral term, because he perceives the problem to be rather pressing, being reminded of it from all sides. He has talked to many people about it, including Mr. Wichterle. The fact that we discussed this issue during his visit shows that the President is very receptive to this, and I am hoping that something will be set into motion at last.

**Another important point raised at the conference was that such issues should not only be addressed in the long term, but that the opposition should be invited to participate, because this is not an issue that can be solved during one electoral term. Unfortunately, the opposition's reaction was very derisive. You talked about the**



**importance of cooperation, probably even at a lower level, like between regions. They should work together and inspire each other, not try to one-up or disparage one another.**

I feel like a lot has changed in that regard. In my presentation I mentioned the YNOVATE platform, which brings together innovation centers across the country. It is a place where we really talk and share experiences. Every month we have a long conference call among innovation centers where we have detailed discussions about the way experienced professionals solve certain kinds of problems, various issues client companies are facing, etc. We share contacts and information so I feel like things are really working out from the bottom up. It is true that we at JIC put in the most effort at the beginning, because we had the most experience, but the investment has paid off: we can now learn from partners who have come a long way and tried and tested other things than we did. YNOVATE has managed to bring together a community of professionals with a shared interest in developing both their regions, but also the country as a whole. Some politicians may see it differently and feel the need to stand in opposition as a matter of principle, but it seems misguided to me. I think that in a country the size of a semi-large Chinese city, it's pointless to compete with one another. If we want to push the country toward the future and accomplish anything, we need to work together.

**It occurs to me that maybe the Czech mindset is not conducive to such cooperation?**

I don't think so. It sounds terribly deterministic to me. I think culture is malleable; it is about

patterns of behavior and repeating practices. What I was trying to point out on the example of South Moravia is the possibility of cultural change. Back in 2001/2002, when we started out and conducted the first in-depth interviews with various businesses, their reactions usually went something like this: "You mean you, as the public sector, want to do something for us? And how do you see that happening? Just give us tax cuts and leave us alone." There was extreme distrust of anything from the public sector. Today the situation is very different. But we are still dealing with the same people. There is of course a younger generation of entrepreneurs who are much more open-minded, but there has also been a shift in the generation of entrepreneurs from the 1990s, once they saw that it was possible to work together without being threatened.

**So you showed them how to do it?**

I think culture is formed out of mutual interaction. And when such an interaction repeatedly results in a positive experience, it can encourage you to change your own behavior and realize that you can talk to these people, that the default setting can be cooperation, instead of suspicion and distrust. When you reach an agreement with a partner from the public sector and they uphold their side of the deal, it bolsters the people's willingness to continue working together. Innovation policies don't always work out, obviously, but at least we can say we have done everything we could to honor our commitments. Our experience is that if you clearly specify these commitments and then deliver on them, or at least explain why you are not able to

deliver, people are willing to put in the time and energy required. What Mr. Kraus (Libor Kraus, COMTES) talked about during the panel discussion, about companies not having any incentive to come to these meetings, that is not a problem for us today. Senior managers and business owners do come to our meetings and they are happy to be there. They tell us that it is always refreshing to see that things are really moving along, that they can have their say and be part of a positive change. Yes, we have to be realistic about the extent of their actual involvement because they are simply super busy. We can't expect them to do the work for us, but the fact that we take input from them and then process it, evaluate it and then take into account when formulating public policies, is always met with positive reactions.

**If you had to single out some of JIC's achievements, what would they be? Is it companies that have evolved from start-ups into functioning companies that have managed to succeed abroad? Or are you more proud of the ecosystem you have managed to build, the fact that public universities, from which you initially felt distrust, want to cooperate with you, or that CEOs of large companies are happy to come to your meetings?**

I think it's a combination of both. Without successful businesses, individual entrepreneurs and their personal stories, the innovation environment in Brno would not be what it is today. At the same time, the whole ecosystem, the fact that people meet and collaborate, share their experiences and make them available to those less experienced, helps each individual company to achieve success. So, in short, I'm proud of the fact that the collaboration between the various partners in the ecosystem works so well, and that it also accelerates the growth of the businesses established in this environment. In fact, I would say that one is not possible without the other. It's kind of like in sports: a good team produces good players, and the individual players' performance makes the team even better.



# Introducing Participants of the Autumn Round of the 2023 Incubation Program

**The BIC Pilsen Business and Innovation Center, together with the City of Pilsen and the Pilsen Region, organized two rounds of the incubation program this year. In mid-September, the board of the incubation program selected six interesting business plans. They range from robots and technology for storing CO<sub>2</sub> in building materials, to a new concept of AI escape games and teaching aids, to fashion accessories such as suspenders or luminescent jewelry. What challenges are the founders of companies solving with BIC Pilsen consultants and what will they use the funding provided by City of Pilsen for?**

## Robotic platform from P&O Robotics s.r.o.

The Pilsen-based company P&O Robotics is developing a robotic platform that will find use in industry, infrastructure, and emergency services. The smallest robot, designed for piping, is now being tested in various environments and supplemented with elements that will improve its practical utilization. Apart from its strength and low weight, the first prototype is water-resistant, easy to decontaminate, and offers real-time data transmission via a mobile network. It can therefore be used for inspection, revision or work in low-load pipelines, such as air-conditioning. It will soon be ready to work in the extreme conditions (high temperature, humidity and chemical stress) that are typical of steam pipelines or fire sites, for example. It will help to warn firefighters in time in the event of an ammonia leak, to check the quality of the installation in a new piping system or to detect a still small defect underground or in an otherwise inaccessible area. Another interesting application, which will require further development, is extending the operational time of drones or allowing robots to operate autonomously, so that a large robot can independently guard large compounds and

parks, or help carry materials or tools to professionals who move among multiple locations in their work (e.g. maintenance workers or delivery drivers).

The company's founders will focus on other things besides robots in the incubation program. They will use the funding provided by the City of Pilsen to obtain certifications or to find an optimal business model. At the same time, they are preparing for their first international appearances at international trade fairs or autonomous vehicle competitions.

## Ecological Building Material by INTECORES s.r.o.

INTECORES' business plan is based on the idea of reducing the amount of greenhouse gases in the atmosphere. Together with other experts in silicate technology, the company's founder Petr Stehlík has come up with a way to permanently store CO<sub>2</sub> removed from the atmosphere in building materials. In addition, this would improve the properties of such materials without significantly increasing their production costs. They can find a market in companies that are part of the building materials production chain, such as cement works, concrete

plants and brickworks, which emit huge amounts of CO<sub>2</sub>. If a company chooses to use INTECORES' consultancy services, they will receive a proposal on how to adapt their production technology and significantly reduce their carbon footprint. Ideally, this will not only ensure their compliance with legislation and gain them a reputation as an environmentally responsible company, but also bring them significant carbon credits in the future.

As part of the incubation program, the company intends to work with a patent attorney to explore options for protecting the rights to their ideas and products. The company needs to consult with experts from the Ministry of the Environment in order to establish how to incorporate the new technology into the carbon offsetting system. With the help of consultants, they intend to refine their business model, choose the most appropriate target customer group, define their services and the best method of compensation, and decide which subcontractors to work with to provide them.

## Filip Kouba's Escape.ing

Filip Kouba, a student of the Faculty of Economics at the University of West Bohemia in Pilsen, is the founder of the "Escape.ing" project – an innovative concept of escape rooms powered by artificial intelligence. Before entering the incubation program, he had already mapped the market, conducted competitive analyses and interviewed owners of other escape rooms. During the incubation program, he has entered into negotiations with potential investors, started promoting his project, created the first puzzles, and is gradually building content for other game modules. At the same time, he is working on his business plan, preparing a financial plan and looking for premises for his first location.

Filip Kouba aims to develop various escape game formats in the future and after testing the concept in his own escape room in Pilsen, he wants his company to become the provider of AI solutions to other escape game operators. Escape.ing has the potential to change the way people perceive escape games, and Filip Kouba, with the help of the incubation program, intends to make his vision a reality.

## Innovation of Computer Science Education Directed by TeaTech s.r.o.

TeaTech was founded by two students, Jiří Švihla from the Faculty of Electrical Engineering of the University of West Bohemia in Pilsen, and David Rajchman from the Faculty of Electrical Engineering of Czech Technical University in Prague. This innovative startup focuses on innovating the teaching of computer science and information and communication technologies in Czech schools in accordance with the new Framework Education Plan of the Ministry of Education. It offers a comprehensive solution including a development module, sensors, a teachers' manual, and online textbooks for students. TeaTech also specializes in technical workshops for elementary and secondary schools focusing on project-based learning and teamwork. A major unique feature the company offers is a wireless link between the development platform and the popular game Minecraft, which supports the teaching of algorithms and coding. The company allows children to connect physical devices to Minecraft's virtual environment to measure real-world quantities and translate them into game mechanics. TeaTech also plans to provide a block-based development environment and the ability to program in LUA for advanced users. TeaTech emphasizes user-friendliness and aims to simplify educational materials for teachers. As part of the incubation program, the company plans to launch testing in selected schools and use the incubation period to obtain feedback on their business plan, find new contacts in the field, and obtain marketing support.

## Denisa Huňatá and Tvoje kšandy (Your Braces)

Gabriela Němečková conceived the Tvoje kšandy ("Your Suspenders") brand while on maternity leave. She was not comfortable wearing pants with a belt and classic suspenders did not suit her. Together with her mother, Denisa Huňatá, she



sewed the first women's suspenders, designed for maximum comfort. High quality was accompanied by original design, and Němečková's suspenders became very popular across Czechia during the Covid pandemic. Since then, the brand has expanded its range of products by a wide range of accessories, appreciated not only by ladies, but also, for example, by motorcyclists. A motorcycle club ordered their own design of neck guards, scarves, t-shirts and shoelaces, all matching the original design of the suspenders. The brand's latest product is the "suspender belt": two matching belts that can form various combinations to liven up your wardrobe. With the help of the incubation program, the company's founders want to increase their production capacity and build an international brand. Their goal is to establish important business partnerships, acquire their own printing machines and work with young designers to deliver unique fashion accessories to Europe and beyond.

## Exclusive Light-Up Jewelry by Jiří Hodač

Creative designer Jiří Hodač wants to become a major player in the field of design, production and sales of exclusive light-up jewelry. He joined the incubation program in order to get quality mentoring and support to speed up his brand's development. The program has provided him with the know-how to avoid unnecessary mistakes and will significantly

advance his business. One of the program's results was a more precise definition of the brand's typical customer, which will enable Jiří to target relevant market segments and design marketing campaigns more effectively. The graduate of Materials Engineering and Mechanical Metallurgy from the University of West Bohemia in Pilsen is looking for a new technical solution to control and miniaturize electrical jewelry and is about to launch a custom-made electronics prototype and design prototypes of 3D prints. In the near future, Jiří Hodač wants to launch a social media-based e-shop, offer three design jewelry pieces and sell several dozen pieces of them within the first six months. In the field of product development, he wants to develop various types of electrical equipment, register a trademark and promote it in the Czech Republic and eventually on the European market.

## 2024 Incubation Program

The next run of the incubation program will open to young innovative companies from the Pilsen Region in January 2024. Support tailored to each project and funding for the purchase of services from the Pilsen Region will be available to newly founded companies with an innovative idea as well as entrepreneurs who have proven their products with their first orders and now need to grow and occupy new markets. For more information visit [www.bic.cz](http://www.bic.cz).

# Kari Hemminki

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In the Chaperon project, we are trying to capitalize on our many years of international experience in translational cancer genomics research and thus increase the competitiveness of the Biomedical Centre in Pilsen.

## **What brought you to the Czech Republic, to Pilsen?**

Well, I have been to the Czech Republic many times before, in fact in the summer of 1968 for the first time. And I had already many Czech students, colleagues and friends from my previous work, so Czech was not a foreign country to me. Actually some of them were also from Pilsen, where I have passed through on my way from Heidelberg to Prague in the past. And it was in Heidelberg, at my retirement from German Cancer Research Center in 2019, where I learned about the European Research Area (ERA) program that Charles University in Pilsen had a chance to win. The position for the leading researcher was announced, I applied, and was selected.

## **How long have you been living in Pilsen by now?**

Since 2020, but interrupted by the Corona years. However, I commute to Heidelberg that is not that far – about 400km from Pilsen, almost on a weekly basis.

## **What is your position at the Biomedical Center of the Faculty of Medicine in Pilsen?**

ERA chair holder in translational oncology at Biomedical Center of the Faculty of Medicine in Pilsen at the Charles University. Given my experience with leadership and research projects, my goal is to bring crucial scientific and managerial know-how that will help increase the competitiveness of the Biomedical Center, but also of the whole faculty and university.

## **What made you in the early days to decide to dedicate your life to research in the field of cancer epidemiology and cancer genomics?**

I have been in research for 50 years and changed research areas many times. The above themes became dominant about 30 years ago not least because of funding issues. Science is heavily reliable on funding possibilities provided by funding agencies in all countries. Just like here, we do not get any money from the university, except the EU money given to the university. And the funding priorities change throughout the time. In the beginnings in Finland and Sweden, the stress was put on the environmental issues. I have changed my focus when starting my work in Germany, where the funds were available. We can say the science is somehow guided by priority areas.

*Professor Kari Hemminki comes from Finland and started his medical studies at the University of Helsinki. He became an associate professor in biochemistry in 1975, and his postdoctoral research was already devoted to molecular biology at Johns Hopkins University in Baltimore, Maryland, USA. He is a professor emeritus of the German Cancer Research Center (Deutsches Krebsforschungszentrum – DKFZ) in Heidelberg, where he led the Division of Cancer Epidemiology from 2003 to June 2019.*



**Could you describe the Chaperon project in brief, please?**

The idea for this program by EU is to support science in countries which are below 50% of the EU average. Czechia was just below this limit and was eligible. The Biomedical Centre of the Faculty of Medicine of Charles University in Pilsen is so far only the fourth successful applicant in the Czech Republic to succeed in one of the ERA Chairs calls. The choice of the project topic (full name CHAPERON – ERA Chair Position for Excellent Research in Oncology) fell on the area of cancer research not only because it is a high priority in this region – Pilsen region has a high incidence of various cancers, including colon, kidney or bladder cancer – but also in connection with the current focus of the Centre, which today has several high-quality research teams focused on cancer. Thanks to the grant, we were able to establish a new Translational Cancer Genomics Laboratory and set up own international research team.

**What expertise and know-how can you benefit from your past working experiences in different countries?**

During my 50 years in science, there has been enormous change in understanding and available research methods and technologies. I have always tried to keep up.

**What does the project team look like?**

The team was recruited with the focus on this particular project and is very international. Setting up the team was difficult because of Corona and because of the fact that Prague young scientists do not consider moving to Pilsen. Now we are about 10 people in the team, with competent senior level of scientists and motivated PhD students. Mainly foreigners, only the minority is Czech.

**How exactly is the project helping in fighting the cancer?**

Understanding about mechanisms may help to develop early detection methods. Comparing epidemiological results among countries should

point out clinical practices improving cancer care. Much of the work around the project deals with molecular genetics and genetic epidemiology. The basic idea is to understand why there are familiar cancers, what the genetic basis might be. In Sweden, we could run a family study of 10 million people. So we had an idea what the familiar cancers are and what the risk levels are. There is also a Nordic database for all the Nordic countries available. Then we carried on with the team in Germany to study the genetic studies and we continue here. For the generic studies, we need samples. Therefore it is very important that the hospital is next to the Biomedical center, which I knew already before coming here. We have even used the samples from Pilsen while my work in Germany.





**In what phase is the project right now and what are the challenges ahead of you?**

We have managed to overcome the early obstacles caused by Corona and now proceed in full speed. The project will end next year in the summer. We have managed to catch up on the schedule delayed at the beginning of the project, where the money for the first years were postponed to later parts of the project. The idea is that the activities will continue, so this the project is a useful investment.

**How do you find the working environment and overall conditions here at the Biomedical Center in comparison with your previous experiences in the field of research and education?**

Unfortunately there are a lot of restrictions of use of the available funds. They have to be used on a yearly basis and many project-related purchases need to be motivated in Czech to the administration, as if they were more competent to direct science than the scientists. From my previous experiences in other countries, if you were awarded a grant for 3 or 5 years you were the one to run it without interruptions and interference. Science project administration including the tender rules and limits is far too heavy in Czechia. Above the EU regulations which are already quite complicated. And the difficult administration causes lots of work on our side to be done and delays the scientific projects. And because the finances for science

are limited, it is a shame that large part of it is used to control it. But my colleagues working here within the projects are very experienced and they are aware of the rules and procedures. And also there are some discussion about some adjustments at the moment to improve it I believe.

**Would you recommend a chance to be part of the projects at the Biomedical Center in Pilsen to any of your foreign colleagues? Would you mention any difficulties you are facing here as a foreign citizen?**

Yes, for any open ERA chairs I would recommend to apply. The Czech language is a challenge for sure. I have started with Czech language course when I came, because there is still a number of people who do not speak any foreign language on a daily life basis, eg. in the shops. But of course English is no problem within my team and work.

**How do you like Pilsen? What do you do in your free time in the Pilsen region? What is your favorite place or activity here?**

Frankly my free time is rather small. But Pilsen is a beautiful old town and I enjoy its culture walking in the center and around the river banks. My favorite activity in warm summer days is to finish my day by dipping in Košutecké jezírko. And when I do have some more free time, I like to do some hiking in the places around the Pilsen region.

*At present, he has been working at the Faculty of Medicine at Charles University in Pilsen since the beginning of the year 2020 as ERA Chair, according to the terminology of the European research support programme Horizon 2020. As a top researcher and world-renowned scientist in the field of cancer genomics and cancer epidemiology, he has established and leads a new Translational Cancer Genomics Laboratory at the Biomedical Centre.*

# Father and Son: The Zdebors Have Dedicated Their Careers to Nuclear Energy

**The topic of nuclear energy resonates more and more in the media, and you have dedicated your entire professional life to nuclear energy. Am I right in imagining that when you get together for Sunday lunch, the rest of your family make fun of you for not talking about anything beside work again?**

JZ: It's not the only topic, definitely not, but it almost always comes up. Somehow the conversation always turns to nuclear power as well.

RZ: It always comes to it at family gatherings, that's just the way it is. And our family doesn't always like it.

JZ: They can tolerate it if we don't drag it out. But if it's a complex topic, we're better off just stepping out and talking alone.

RZ: Or we get told to finally give it a rest, especially by my sister.

**Do you always agree with each other when it comes to the energy industry and related current events? About the construction of new power plants, for example?**

Both: I guess so.

JZ: As far as we are concerned, there are no disagreements, the contradictions are elsewhere.

RZ: As far as new power plants are concerned – whether to build them, what kind of plants to

build, who should build them and how long it should take, which Czech contractors to cooperate with, we are in complete agreement here, because if you're familiar with the issue, at least a little bit, there are not really that many options, so it is an easy consensus.

JZ: We have some expertise, but even if you just understand the issue a little bit, maybe even just use common sense, and think about what electricity consumption will be like in the future, that Dukovany will eventually be shut down, that we have a long tradition of nuclear industry in this country... When you put it all together, you realize there are not that many alternatives. And when you consider renewable sources, knowing their efficiency and how much energy they can realistically produce, you can only reach one conclusion.

JZ: The thing that unites people today, especially the younger generation, is saving the planet and the ever-increasing energy consumption. It would seem like restrictions and reductions are possible, but in reality, we're used to a certain standard of living that requires a huge amount of energy and it's still increasing. And now, especially in Europe, we've come up with the idea that we're going to boost the environmental approach by switching to electric cars. If we start driving electric cars – I mean, I have no idea how fast the transition can be, whether it can really be as rapid as people

imagine – we will need other sources of electricity. Where are we going to get them? Nuclear power is clearly the cleanest source of energy, even if a lot of people don't like to hear it. It is still the cleanest and most efficient way to produce electricity. But that is not just our opinion; a number of European countries that have already abandoned nuclear power are considering returning to it – and I'm not talking about Germany and Austria, but Italy, for example. The Italian Parliament has already instructed the government to draw up a procedure for returning to nuclear power, for precisely the reasons I have just mentioned, because we desperately need new sources of energy. Where else would it come from? And we could name other countries that have decided in the past to gradually move away from nuclear energy, such as Sweden, but that has changed too. Sweden has decided to build new reactors wherever they are needed. And Sweden, by the way, is a prime example a country with a clean energy approach: half of their power comes from nuclear energy, half from renewables, especially hydro power. But Czechia does not have the natural conditions for such a split.

**Listening to you, I can't help but think that has to be a great satisfaction for the Czech Republic, considering that just a few years ago we were mocked for sticking with nuclear energy.**

RZ: It does give us a certain sense of satisfaction, knowing that we were more or less right all along. And it's interesting that even the general opinion or the mood in our society has been more or less pro-nuclear for a long time, albeit with some minor fluctuations, and it's never really swung in any other direction. Unlike Germany, for example, which has set on a slightly strange path, in my opinion. So, yes, you are right, it is somewhat satisfying, but I don't think there's any point to any "I-told-you-so's." We just need to take advantage of it now because there are nuclear coalitions forming in Europe now and Czechia, along with France, plays quite a major role in that so this is an important moment for us and hopefully it will be a major turning point for Europe. It doesn't mean that nuclear energy





*Roman Zdebor  
and Jan Zdebor*

**Is it true that interest in studying power engineering is steadily declining? And do you think the situation will change given the prospect of a lot of new projects?**

JZ: That's obviously a very pressing question. This has been an issue for quite some time, I would say since 1989 at least. At the time, people were excited to be free to study the humanities the way they wanted to, and STEM disciplines sort of fell behind.

RZ: It was also emphasized that we needed to expand the services sector.

JZ: Consider how often it happens that when you ask a celebrity about their school days, they'll tell you they hated math, physics, and chemistry. I don't even know why, but STEM disciplines were viewed almost pejoratively at one time. After the Velvet Revolution, we wanted to achieve prosperity, and so economics was very much in the forefront. I think that's just one of many reasons. I would also like to mention that we have roughly over 70 universities in the Czech Republic. Two thirds of those are private, but not one of those private ones is a technical college. And of the remaining third, only a small number are purely technical schools, which means that the number of students in STEM fields is lower than it should be. That is one of the reasons, albeit not the main one. Another factor is the social prestige associated with each field. The more prestigious a job, the more it's valued. IT jobs pay exceedingly well. And then there are such professions as doctors or bankers... students often imagine that if they major in economics, they can then work in a bank and earn a lot of money, and majoring in economics is not all that difficult. There is a general idea that STEM fields are very intellectually demanding and a lot of people flunk out, which is actually true. If you put all the reasons together, I think the main factor is social prestige. When today's young graduates seek employment, they are interested in more than a good salary. They want other benefits as well, which I find a little surprising: whether they can work remotely, how much time off they will get. The emphasis on comfortable living is very natural, and the demanding nature of STEM jobs can be discouraging.

is Europe's only salvation, but it's certainly one of the main resources we should be cultivating, especially in the Czech Republic, because with the natural conditions that we have, we don't have much of a choice.

JZ: When I think about the fact that not long ago, from my perspective at least, we were still a part of Czechoslovakia... Our neighbor, Slovakia, is even better at utilizing nuclear energy than we are, and they're still increasing their output because they've connected the third unit of the Mochovce nuclear power plant to the grid this year, and they're probably going to connect the fourth unit next year, so they're going to be generating an incredible amount of electricity using nuclear power. The tradition, the need, and the lack of any other choice, those are all reasons for giving nuclear power a green light.

**Roman, you're as involved in nuclear energy as your father. If he were a surgeon, would you be a doctor too?**

RZ: That's a really good question, I like it. I would have to think back a long time, and I don't know if I'll be able to express it correctly. When I was about 15, I was thinking about studying at a conservatory, but I ended up not going. But it's true, now that I recall, that when I was in elementary school,

I wanted to be an engineer because that's what my dad's title was. My dad's profession definitely had an impact on me. But whether I'd become a surgeon if my father was one, I really can't say. I think there must have been some pretty strong influence to push me toward the path I am on now. I originally wanted to go to grammar school, but I didn't get in, so I enrolled in a secondary engineering school. From then on, my path was pretty much determined. And it was much more logical for me to pick nuclear engineering rather than turbine engineering.

**And do you have another successor in the family to follow in your footsteps?**

RZ: Yes, my son.

JZ: We have a grandson.

RZ: Honza is not a nuclear engineer like us. He is an electrical engineer, he also graduated from the University of West Bohemia in Pilsen. He works at CEZ, specializing in thermal power plants, and he is very happy. His specialization is configuration management – deciding whether a plant layout is right or wrong. It is a way of organizing information about a power plant's equipment.

JZ: He used to be into IT, and this is IT, in a way. So you could say we have three generations of power industry specialists in our family.

# ChatGPT Explains Quantum Materials

The University of West Bohemia in Pilsen is launching a project to study quantum materials. The UWB Quantum Materials for Applications in Sustainable Technologies project, which was successful in the prestigious Teaming for Excellence call of the Johannes Amos Comenius Operational Program in August, was officially launched in October 2023. An international scientific team led by UWB will focus on researching materials with the potential for use in quantum computers, sensors, integrated circuits, or energy-efficient electronic devices. What does quantum technology actually solve, what is its contribution to society, and what changes can it bring about?

We asked the AI, using the ChatGPT-4 September 25 Version tool, and refined our "prompt" twice for a better result. Not that we don't trust artificial intelligence, but we still wondered if the article was factually correct, so we asked UWB Rector Miroslav Holeček for a quick fact-check. "The first two versions are fine; the third got one sentence wrong," was his response. We don't know whether we should be relieved that we can more or less rely on Chatbot, or whether we should start

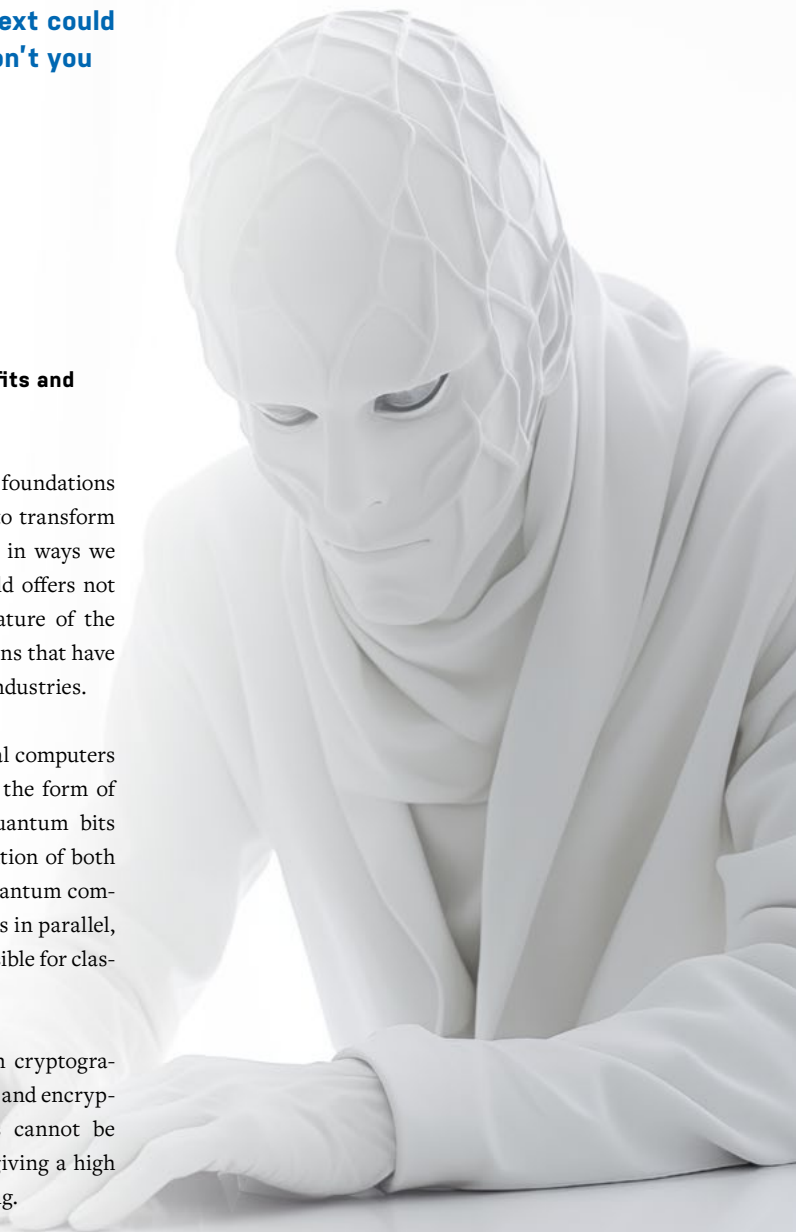
worrying that smart intelligence has already become too smart. Stylistically, however, the text could do with a little tweaking, don't you think?

## VERSION 1

### Quantum Technologies: The Benefits and Transformation of Society

Quantum technologies, based on the foundations of quantum mechanics, have begun to transform the world of science and innovation in ways we have rarely seen in the past. The field offers not only theoretical insights into the nature of the universe, but also practical applications that have the potential to revolutionize many industries.

1. Quantum computers: while classical computers use bits to represent information in the form of 0 or 1, quantum computers use quantum bits (qubits), which can be in a superposition of both states simultaneously. This allows quantum computers to perform many computations in parallel, solving problems that would be infeasible for classical computers.
2. Quantum cryptography: Quantum cryptography is a breakthrough in data security and encryption. Quantum-encrypted messages cannot be eavesdropped on without a breach, giving a high level of security against eavesdropping.



3. Precise measurement and sensors. Quantum technologies can significantly improve the accuracy of measurements in areas such as the detection of gravity, magnetic fields, or temperature. This precision can have far-reaching implications, for example in medicine, geology, or navigation.

Benefits for society: The benefits of quantum technologies can have an impact on everyday life. Better encrypted communications, faster and more efficient computer systems, and advanced diagnostic devices in medicine are just some of the potential benefits.

The change quantum technologies can bring: Apart from technological improvements, we can expect quantum technologies to have a profound impact on the economy, education system, and even our culture. New fields, professions and research topics will emerge at a speed with which society will have to keep up. This may require new approaches to education, regulatory mechanisms and investment in research and development.

In conclusion, quantum technologies are not just the next step in technological progress, but a leap into a new era of knowledge and innovation. They still have a long way to go to achieve their full potential, but it is clear that their impact on society will be immeasurable.

## VERSION 2

Embedded in the deep principles of quantum mechanics, quantum technologies are fast turning out to be the breakthrough that has the potential to completely transform our technological landscape. This revolution not only brings new perspectives to the academic world, but also has a real and tangible impact on the daily lives of many people.

Consider quantum computers. At first glance, a quantum computer may look like any other machine, but its heart, the qubit, is the key to an incredible computational potential. Qubits can exist in multiple states at once through a phenomenon called superposition. This ability to perform multiple at

the same time opens the door to solving complex problems in fields such as cryptography, medicine and climate science faster than ever before.

In the field of cybersecurity, quantum cryptography offers a way to create secure communication channels that are essentially unbreakable. Any attempt to disrupt such communications would be immediately obvious, which could spell the end of traditional hacking and eavesdropping.

But perhaps the biggest changes await us in areas where we might not expect them. Precise quantum measurements could improve diagnostic methods in medicine, detect hidden natural resources deep underground, or improve the accuracy of global navigation systems.

In summary, quantum technologies are not only redefining the boundaries of what is possible in technology and science, they are also forcing us to rethink how we understand the world around us. In a world where quantum technology plays a key role, we can expect faster innovation, stronger security, and a deeper understanding of nature.

## VERSION 3

### Quantum Technologies: The Key to the Future?

With new advancements in science and technology, we often encounter concepts that may sound complex but their implications for our society are revolutionary. Quantum technologies are just such a concept. But what do they actually entail and what is their significance for ordinary people?

#### A small quantum world

Quantum physics is the study of particles so small that their behavior cannot be described by standard physics. This microscopic world follows special rules that may seem counter-intuitive. And it is these rules that open the door to technologies we could, until recently, never have imagined.

#### Quantum computers

While a classical computer works with bits that can take on values of 0 or 1, a quantum computer works

with quantum bits (qubits). These can be in a superposition of both states at the same time, allowing quantum computers to perform many calculations simultaneously. This gives them the potential to handle tasks that would be impossible for conventional computers. For example, decomposing large numbers into sums of prime numbers, which is the key to some modern encryption techniques.

#### Communication and encryption

Quantum technologies can also revolutionize communication. Quantum encryption would be almost impossible to break, increasing the security of our communications. Then there is quantum teleportation, which allows the transfer of information between two locations without the physical transport of particles.

#### The future is quantum

Although quantum technologies still face many challenges, their potential is enormous. They could completely revolutionize our ideas about computing, communication and encryption. In a world where data and information play a key role, the quantum revolution can bring about real change. One thing is certain: we are on the threshold of a new era where the boundaries between the possible and the impossible are constantly shifting. And quantum technologies will be at the forefront of such progress.

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