

# LODZ CREATES INNOVATION

NEWS MAGAZINE OF THE CITY OF LODZ

NO. 4 (20)/2018

## KNOWLEDGE-BASED ECONOMY

DIGITAL FUTURE OF EUROPE

PROFESSIONAL SUPPORT  
ON THE ROAD TO SUCCESS

CITY OF GREAT PERSPECTIVES

THE ONLY SUCH PLACE  
IN POLAND





**CHECK OUT  
LODZ AIRPORT  
HOLIDAY  
OFFER**

**DUBROVNIK  
ZAKYNTHOS  
ANTALYA  
BURGAS**

**LODZ AIRPORT**  
CENTRAL POLAND  
[www.airport.lodz.pl](http://www.airport.lodz.pl)



**ANNA KRAWCZYK**  
EDITOR-IN-CHIEF

“Poland must actively participate in the scientific and technological revolution in order to successfully compete on the global market. One of the tools of the future that will change the industry, commerce and services is artificial intelligence,” argues Karol Okoński, Secretary of State at the Ministry of Digitization, in the discussion opening this issue.

The amount of data that has to be processed each day before making a decision is increasing very rapidly. Thus, businesses need efficient and fast tools. Introduction of informatization, automation and robotics is absolutely necessary for enterprises that want to be competitive. It is particularly effective for the production sector, but not only for it. There are many advantages, and the most important ones include increasing the speed of operations, improving the quality of production and, importantly, reducing costs. Just like during the first industrial revolution machines supported muscles, now they support the brain.

This technological revolution that takes place in front of our eyes requires, however, a systemic approach. A modern education system must be established because, as machines become ever more widely used, employees can tackle more creative solutions. The issue is that both employees and enterprises have to view the introduction of

artificial intelligence as an opportunity and not a threat.

Cyber security is becoming more and more important. It will be assisted by the implementation of a modern 5G network. This new cellular network standard will provide faster communication connections and a better network throughput. Although, according to the European Union requirements, it should cover all of the largest European cities before 2025, Lodz has been already running a pilot programme. Opportunities and challenges standing before the city are discussed by Prof. Sławomir Wiak, rector of the Lodz University of Technology.

We demonstrate the practical use of the 5G network on the example of projects by three companies: Asseco, Comarch and Ericsson. Their representatives also believe that we are heading toward a new technological revolution that will involve many branches of the economy. New development perspectives will appear for the production sector as well as for the sectors of power distribution, public safety, and even for transport and health care.

There is no shortage of companies in Lodz that have become experts in this field. With great pleasure, we present the achievements of some of them in this issue, the main topic of which is artificial intelligence. ●

Photo: Paweł Ławreszko



**Rzeczpospolita  
Polska**



**Unia Europejska**  
Europejski Fundusz  
Rozwoju Regionalnego



6



12



26



## INTERVIEW

- 6 Knowledge-based economy**  
 “AI can help us to identify which information is real and which causes information noise and chaos,” says **Karol Okoński**, Secretary of State at the Ministry of Digitization

## COLUMN

- 9 Warning—system error**  
 Biological systems also sometimes turn off or hang

## SCIENCE

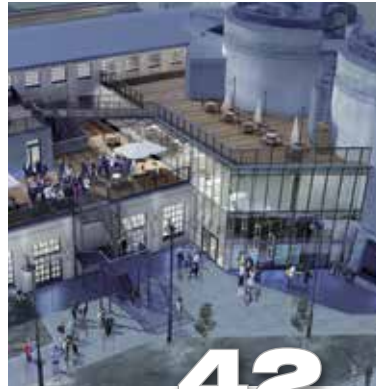
- 10 Artificial intelligence embraces business**  
 The development of artificial intelligence is closely related to machine learning
- 12 Digital future of Europe**  
 “We cannot lag behind the world. The 5G Strategy for Poland is a part of the European Union’s economic policy,” reminds **prof. Sławomir Wiak**, Rector of the Lodz University of Technology
- 15 Planning and deploying**  
 Lodz University of Technology will also play a vital role in implementing 5G
- 16 Robotics of the future**  
 It would be proper to utilize the potential of the inventors from Lodz who want to develop the best solutions for both sides: robots and people
- 18 Construction of the future**  
 The dynamic development of intelligent building control systems means that the need for highly specialized professionals will be growing

- 20 Professional support on the road to success**  
 The current president of Toastmasters intends to promote Pathway, an educational programme available to all members of the organization

## ECONOMY

- 22 Credibility in the digital world**  
 “Every company, regardless of its business profile, becomes a technology or IT company because the role of IT in all businesses has been increasing in importance,” says **Wojciech Walczak**, manager at Accenture Advanced Technology Center Poland
- 24 Stock market profits generated by artificial intelligence**  
 The adventure with AI began with the doctoral dissertation of Michał Paluch about the use of artificial neural networks (ANNs) to forecast stock prices
- 26 We design emotions**  
 The market is oriented towards electric vehicles and here the mechanics is not the only crucial element. The design plays an equally important part too
- 28 A life-changing technology**  
 People might not be able to fully feel the difference 5G makes yet, but surely Internet apps, the media and advertising can make use of it
- 30 City of great perspectives**  
 In the near future, a unicorn monument will be created in Lodz as well. Japanese artists have already begun making it
- 32 A self-improving system**  
 The Polish centre of Enigma Pattern is crucial for the company’s development. It is a group of the best specialists and enthusiasts who create and develop artificial intelligence-related technologies

30



42

### 34 No risk of error

Digital Workforce was created to do precisely that—help customers better understand their automation needs, clarify their strategic vision and help combine products and services, so that they can best serve internal and external clients

### 37 Flirting with business

The investor speed dating gives entrepreneurs an opportunity to obtain funding outside the competition

## CREATIVE INDUSTRIES

### 40 Inner balance and business

Women of many talents work at Sunday is Monday

## TOURISM

### 42 The only such place in Poland

People who now create games or cartoons as well as established comics authors began their adventure with this realm in Łódź

### 44 CALENDAR



#### PUBLISHER

Investor Service and International Cooperation Bureau  
Mayor's Department  
City of Łódź  
al. Politechniki 32, 93-590 Łódź  
tel.: 42 638 59 39  
fax: 42 638 59 40  
e-mail: boi@uml.lodz.pl



#### REALISATION

INFRAMEDIA Anna Krawczyk



ul. Konstruktorska 10c/25, 02-673 Warszawa  
tel.: +48 22 821 0 777  
e-mail: biuro@inframedia.pl  
www.inframedia.pl

#### EDITOR-IN-CHIEF

Anna Krawczyk  
a.krawczyk@inframedia.pl

#### JOURNALISTS

Katarzyna Józwik  
k.jozwik@inframedia.pl  
Rafał Wilgusiak  
r.wilgusiak@inframedia.pl  
Bożena Wielgo  
b.wielgo@inframedia.pl

#### EDITING AND PROOF-READING

Agnieszka Zygmont  
Anna Mędrzecka

#### TRANSLATION

ATET Euro-Tłumacze Sp. z o.o.  
Marta Kaczyńska

#### PHOTOGRAPHER

Paweł Ławreszuk

#### LAYOUT & DESIGN

Artur Weber—akon-mp.pl

#### COVER PHOTO

Adobe Stock

#### Circulation

1000 copies

This publication may not be transmitted in any form in whole or in part without the prior permission of Inframedia of the Publisher. While every care has been taken in the publications of this magazine, Inframedia the Publisher can not be held responsible for the accuracy of the information herein or for any consequence arising from it.



# Knowledge- -based economy

In today's world, new technologies have an immense influence on both economies and societies all around the globe. In order to effectively compete on the global market, Poland must take an active part in the scientific and technical revolution. One of the tools of the future that will change industry, trade and services is artificial intelligence, argues **KAROL OKOŃSKI**, Secretary of State at the Ministry of Digitization in an interview with Anna Krawczyk.

Leading economic experts believe that in the coming years data-driven management will be the fundamental change to take place in the world of business. Businesses that would be able to maximise the potential of artificial intelligence will gain a competitive advantage.

**Mechanisms that until now have been the cornerstone of economic development have lost their relevance due to the technological revolution...**

In today's world, investing in areas based on data processing brings the most benefits from the perspective of economic development. In the digital era, data has become a resource that serves as the basis for creating new value and fulfilling human needs. Properly interpreted data is the source and the foundation of one of the most valuable economic assets, namely information. It constitutes the infrastructure necessary for conducting and undertaking economic activities. They therefore affect GDP growth.

**Indeed. Thanks to artificial intelligence (AI) being used in production processes, enterprises develop much faster. An Accenture report, which examined the impact of artificial intelligence on 12 developed economies, shows that by 2035 AI could double the annual rate of economic growth. What's the situation in Poland?**

We see the progress in this area, but it's very difficult and slow. This stems from the development of information technologies, which affect company competitiveness and productivity on their own. The report "Data-driven economy – Industry+", commissioned by the Ministry of Digitization, shows that operational activities of enterprises operating in Poland are based on data, data transfer and its processing only at a level of 16.6 percent, while in the EU the average level reaches 21 percent. The sectors of the economy that demonstrate their greatest use are "Information and communication" and "Hospitality and catering". In the case of Poland, the intensity indicator values are 30.4 percent and 23.7 percent, respectively, and are close to the European average. In other sectors, such as transport and general industry, we have much catching up to do. Enterprises are still investing in a rather limited scope, mainly in equipment, software or licenses, branding, image and training. Nevertheless, this process is progressing all the time. Data collected in the report shows that among enterprises that recorded an increase in turnover, as many as 81

percent introduced innovations. It can therefore be predicted that the importance of these technologies will steadily grow and cover other areas of the economy.

**○ In the digital era, data has become a resource that serves as the basis for creating new value and fulfilling human needs**

**Where do you see the possibility of using AI in the Polish economy? How will you promote AI-based technologies?**

The intense growth in the amount of data used by enterprises in taking business decisions makes it a necessary tool in effective conducting of any type of activity. Artificial intelligence or – more broadly – computerisation, automation and robotics have a significant influence on quality improvements, speeding up operations and reducing costs, especially when it comes to repetitive tasks in the production sector. Our companies have no other choice and must enter this global race, as otherwise they would lose their competitiveness and customers. For example, orchids were a widespread crop among farmers in Poland. Currently, there is one entity operating on the market, which survived only thanks to implementing an innovative cultivation system that amounts to a kind of artificial intelligence. Orchids are flowers that are very sensitive to harmful factors. When affected by a disease, they quickly transfer it to other plants, which is why an early detection system is very important. This is based on an analysis of an image captured by specialised cameras. Thanks to a quick reaction time the infected flowers can be removed before the disease spreads. At the same time, the system makes it possible to determine which flowers have a chance of survival, thus significantly reducing losses. We, as the state, support such initiatives by allocating funds to assistance programmes, for example research and development, but we also want to use them for specific purposes that can be applied on a massive scale – in agriculture, in the furniture industry, in security. Our goal is to eliminate all barriers and stimulate innovation. We co-operate closely with, for example, the Ministry of Science and Higher Education, in order to increase the flow of personnel to strategic sectors of the economy, develop technical facilities, assign grants to innovative scientists or adjust the education system to existing needs.



**Thanks to AI being used in automation systems, machines replace people in performing automated tasks. This allows enterprises to more effectively use human resources. The employee can focus on creating innovative solutions, not on tasks that a machine can do in their place. How can we take advantage of this opportunity while keeping people from worrying about job losses?**

This is a challenge. Artificial intelligence gives the potential to create new professions, such as robot teachers or data analysts. Inevitably, this requires a thorough re-profiling of staff and creating opportunities for people to acquire skills. This process should be encouraged from the very start, i.e. already at the stage of educating children and adolescents through teaching programming, data analysis, etc.

**This issue brings with it some challenges for the state. New laws will be needed to regulate the use of AI in the industry. Is any work related to this ongoing in Poland?**

As a government, we create a certain vision of Poland in 20-30 years. On this basis we plan how to make the best use of all opportunities related to, for example, using EU funds. Under the “Digital Europe” and “Horizon 2020” programmes, the European Union invests in strategic digital capabilities, such as artificial intelligence, high-performance computing systems and cybersecurity. We expect a detailed European strategy in this area to be established in about a year. This is something we need to prepare for in order to cease being only a consumer and become a producer of new technologies, as this allows us to derive certain profits. We identify our national specialisations that will enable Polish companies to enter international markets. We involve not only the business world, but also scientists and academic circles in these activities. An example of using

artificial intelligence in the area of cybersecurity may be the fight against so-called fake news. This means that AI can help us to identify which information is real and which causes information noise and chaos. There may be more such applications.

● **Under the “Digital Europe” and “Horizon 2020” programmes, the European Union invests in strategic digital capabilities, such as artificial intelligence, high-performance computing systems and cybersecurity**

**How can the service sector develop thanks to AI?**

Just as during the first industrial revolution, when machines began to support the work of our muscles, so now, during the second industrial revolution, they begin to support the work of our mind. In principle, AI can revamp the entire services sector, e.g. by giving artificial intelligence decision-making competences. The question is how risky is it for robots to take control over processes happening in organisations, and whether people will be able to control this. I don't think I'd worry about artificial intelligence taking over. I don't see such a threat. And the sooner we tackle the challenges of artificial intelligence, the sooner we can reap the benefits and overcome the threats.

**Thank you for your time.** ●

BY RAFAŁ WILGUSIAK



# Warning - system error

BY AGATA DOMAŃSKA



Too much information or stimuli may cause an error in the system. When the amount of information is too big to process, it can hang or turn off. And this isn't just about machines or computers. Living biological organisms also behave in this manner.

A system error is a daily risk. Especially when the entire world lives and feeds on information, swirling around it. All systems, regardless of structure and organization, can be overloaded and completely lose their capacity (at least temporarily). In a computer, such a situation can be encountered when one of its components physically ceases to work, or when the programming begins to act up. If we flood the processor with an amount of data beyond its capabilities, the system will hang, freeze or terminate – until the help arrives. In a company, errors can arrive in periods of great changes, e.g. structural ones – new bosses come, distribute new functions... but until people know exactly who's responsible for what and how to do it, they will pretend they know what's happening. And they will pretend to do their job. For a certain period, a system error will cause the company to operate in safe mode – restoring efficiency only as it fully adapts.

Biological systems also sometimes turn off or hang. An example of this might be a person in a state of sudden acute stress. A strong reaction in such case is an adjustment disorder, i.e. a transient abnormality in adapting to reality. Too many stimuli (or too strong stimuli) have flooded the nervous system (it is our motherboard and the processor). Therefore, the work and balance of the system are disrupted. As a result, such person – hitherto in perfect mental and emotional health – can experience a daze, a state of derealization and disorientation. And in the most acute cases, the system can completely hang and enter

the dissociative stupor, a state where one becomes immobile, stops reacting to stimuli and completely disconnects from reality. It can also happen that an error does not hang the system but results in its weird, incorrect operation – and such person experiences the so-called dissociative fugue. It is a type of escape, a trip combined with the erasure of existing data. Such person forgets who they are, does not return home – leaves and procures a new identity. The growth of tumours is also a type of biological error. Hitherto normally dividing cells, obedient to DNA sequences, begin to act different. One small DNA molecule is replicated erroneously, and an entire structure is created, living according to its own rules.

Errors can make unmanned cars kill pedestrians, or pharmaceutical companies produce a drug that harms instead of helping.

But errors aren't always bad. They often have surprising positive effects. Let's take our presence on this planet: we're also an effect of an error. The fact that the original forms of life mutated into more complex forms is an effect of change which, from the point of view of the original form, is an error. Perfect operation is one where a process takes place identically each time. The wheel of changes is turning, and the effect is always the same as in previous turns. And it goes on and on through subsequent cycles... and when a new element appears making the end result different than always – the error becomes the source of a new quality. ●



BY BOŻENA WIELGO

# Artificial intelligence embraces business

Although it is common knowledge that the influence of artificial intelligence on our lives, including business, will be growing, so far no research has been carried out that would show in what specific way this technology can affect business.

Whatever research there is provides information about the expected influence of artificial intelligence (AI) on the growth of the world's economic potential. Polityka Insight and Dentons, a law firm, prepared a report titled "Artificial Intelligence of the Polish Economy" (2018) commissioned by Microsoft. It suggests that using AI in business may increase the global income by \$1.49–2.95 trillion in the next ten years. Although the scope is broad, it is possible that the actual numbers will exceed those forecasted.

## MACHINE LEARNING

The development of artificial intelligence is closely related to machine learning, i.e. the self-improvement of machines based on the analysis of data fed to them and identifying patterns in the information provided. In effect, the machine is expected to take some action and the relevant algorithms will allow the software to automatize the process.

Machine learning or, to be more precise, approximation is researched by Prof. Andrzej Nowakowski from Lodz University. He coordinates the subject called Artificial Intelligence and is

currently heading the project titled "Aproksymacja zbioru uczącego do znalezienia najlepszej funkcji z danej rodziny w uczeniu maszynowym" (Approximation of a training data set to find the best function from a given family in machine learning).

## PERSPECTIVES FOR APPROXIMATION

Approximation (Latin *approximare*—approach) is, according to the Collins dictionary "an estimate of the value of some quantity to a desired degree of accuracy". Usually, approximation is applied to entities, e.g. functions which are made complicated by simpler entities. It is frequently used when empirically obtained data are likely to contain mistakes.

"One of the tools used by approximation is neural networks. This is a mathematical structure which computes or processes signals via units called artificial neurons. Artificial neural networks are an ultramodern computing tool used to solve numerous gruelling problems," says Professor Nowakowski. "However, we have a number of neural networks at our disposal and we frequently have to determine

which one to choose for our task. This, in turn, profoundly impacts the final result,” he explains.

That’s why the neural networks which are able to adapt their structure and parameters to various tasks (they are called “constructive”) play such a crucial role.

“What they have in common is that they build reduced topology networks. Such solution offers an alternative to the standard trial-and-error method of finding the correct architecture,” explains Professor Nowakowski. “In our research, we focus on networks which are one of the most effective ones, namely self-organizing neural networks (SONN). It’s notable that, unlike other networks, they don’t struggle with learning difficulties (e.g. initial network topology, parameters defining its structure, local minima, conditions for aborting learning and tendencies of networks to overlearn),” says the scientist.

When SONN learns, it gradually adds neurons as well as the links between respective layers of neurons. It mimics processes occurring in the human brain. “An unwelcome feature of typical SONNs is that they aren’t able to work with uncertain data,” says Professor Nowakowski. “In real life, however, we increasingly have to cope with uncertain data related to enormous amount of information, i.e. big data. Moreover, the uncertainty of data is something natural in the real world because, e.g. measurements are inaccurate, sampling is faulty or source data are obsolete,” he adds.

And here’s the tricky part because uncertain data need to be taken into account very carefully. Otherwise, further processing might lead to obtaining unreal or downright wrong results.

“We now have certain tools, i.e. algorithms, which support processes concerning uncertain data, e.g. vector machines, decision trees and fuzzy sets theory,” says Professor Nowakowski. “However, the SONNs which Sebastian Wojczyk, PhD from my team created use neither fuzzy sets theory nor decision trees and yet they can classify more and with greater precision. They work on an analogical principle to the human brain,” he observes. They rely on power of discrimination adopted from typical SONNs.

“SONN receives patterns described by varying numbers of elements. The algorithm which constructs discrete self-organizing neural networks is able to make use of all possible data, even if it’s uncertain,” says Professor Nowakowski.

Neurons and connections in discrete SONNs are divided into two groups. One of them is responsible for certain data and the other one, for uncertain. The

first group is modelled on a typical SONN mechanism and the second is innovative and dynamically weighs neural connections in this set.

They have one drawback though. The patterns are recognised well or very well (as in the case of SONN), but the more the input data diverge from these patterns, the worse the classification or identification is, sometimes it’s even unacceptable.

“Our project is supposed to solve one of the many tasks set before machine learning. Theoretical research is complete. It resulted in creating two mathematical models based on contemporary methods of optimization theory. Current research and calculations are aimed at constructing appropriate algorithms which would corroborate these theories.” ●

---

**Prof. Andrzej Nowakowski** from the Department of Mathematical Analysis and Control Theory at Lodz University was engaged in numerous research projects, e.g.:

- qualitative theory of ordinary and partial differential equations,
- optimal control theory and its application in biology and mechanics,
- computational methods in biology and mechanics,
- machine learning – the analysis of training data sets and approximation of the best solution.

Prof. Andrzej Nowakowski also authored more than 100 articles for foreign scientific journals. He lectures and holds seminars about artificial intelligence and neural networks as well as seminars for PhD candidates about machine learning. He lectures and has tutorials on partial differential equations for Erasmus students. Prof. Nowakowski supervised over 200 MA theses, mainly about artificial intelligence and 21 doctoral dissertations (three of which were about neural networks).

He is the head of the project titled “Aproksymacja zbioru uczącego do znalezienia najlepszej funkcji z danej rodziny w uczeniu maszynowym” (Approximation of a training data set to find the best function from a given family in machine learning). Other members of the project include: Piotr Fulmański, PhD, Marta Lipnicka, PhD, Sebastian Wojczyk, PhD and Konrad Kosmatka (PhD candidate).



BY BOŻENA WIELGO

# Digital future of Europe

According to the European Union requirements, by 2025 all the largest cities in Europe, and therefore in Poland, will have 5G coverage. Bożena Wielgo discusses the opportunities and challenges related to the introduction of this state of the art technology with Prof. SŁAWOMIR WIAK, Rector of the Lodz University of Technology.

## Why is the introduction of a 5G network so important for the civilizational progress?

The “5G Strategy for Poland” developed at the Ministry of Digitization is a very important document in the context of civilizational progress. However, we cannot discuss it separately from the strategic goal set by the European Union for the member states in 2016. The guidelines call for the creation of Digital Intelligence Hubs – places intended for the execution of digital technologies.

We should answer the question: What are these technologies for? They constitute a very important tool for the digital growth of the present and future society. They are also a great step in the direction of building a smart environment. In the case of Lodz, we are talking about the so-called smart city. The 5G technology should help us in the creation and expansion of this concept. Our expectations of life and technology are ever growing. We want it to support our actions. The development of mobile technologies practically forces the introduction of 5G into our private as well as corporate lives, and further into the operations of our country.

Prime Minister Mateusz Morawiecki confirmed how important the 5G Strategy for Poland is. During this year’s Impact conference in Krakow, the most important event concerning the future of digital economy for business, start-ups, science and

administration, another element of this strategic concept of state development was announced, correlating to the aforementioned strategy; it mentions the financial support for the development of artificial intelligence. Its development necessitates fast data transfers, so the implementation of mobile technologies is crucial to the entire process.

We are not just at a concept stage now. In the case of the Lodz University of Technology, one extremely important fact is that we have an ICT cluster involving over 30 companies. Among others, Ericsson is a part of our cluster. With its main competence centre in Lodz, it is a leading company in terms of the 5G technology. Asseco and Comarch are also worth mentioning, as are service providers, i.e. operators. Our goal is to obtain the status of a Key National Cluster. And this is a very important part of the comprehensive approach to the development of digital technologies.

## What does the European Union say about the introduction of new digital technologies in the context of 5G?

Each year, the development of smart cities will result in an increase in production by 100 billion dollars with respect to the entire Union. This is a huge amount. Furthermore, we have to add that we will need about 1.7 million science employees to develop and support these technologies.

Implementing this technology to build smart spaces will bring about benefits not just for the cities, but also for small communities that can grow in a dynamic manner, taking advantage of the opportunities provided by the 5G technology.

Another developmental impulse is the growth of demand for about 10 million specialists in this field at the scale of the European Union.

### **How will the 5G technology impact the development of the economy?**

The foundation of this technology is artificial intelligence which is in turn based on fast data transmission. There is a well known idea called “machine to machine,” meaning communication between devices. In this context, it is estimated that the delay time should not exceed 3 milliseconds.

We increasingly often talk about electromobility, that is – ultimately – about autonomous vehicles. E-health, i.e. remote health care, is the future as well. For these fields to grow, we need the 5G technology. In both cases, the speed of data transfers is key. Autonomous vehicles driving on a motorway and intending to overtake other cars must communicate with them and make appropriate decisions, which is impossible without fast data transfers.

This mobile technology can be used in production processes as well as in on-line maintenance services. It is also being used in agriculture, which has been undergoing a very rapid development. Here, we can mention autonomous vehicles used in cultivation.

When talking about this mobile technology, it is difficult not to touch on its uses in the remote control of household appliances, e.g. cleaning robots, washing machines or refrigerators.

We know that there is a very wide acceptance of mobile technologies in distribution centres. Robots with remapped courses significantly shorten the dispatch time.

### **What can you say about the issue of appropriate education in this regard?**

I am worried by the fact that – unfortunately – there are too few educational programmes in this regard. It is worth mentioning, however, that the Ministry of Digitization announced a competition for a campaign concerning the development of digital competences as part of the Digital Poland Programme. As part of the competition, the Lodz University of Technology submitted a project to establish a nationwide IT Mastery Centre. As a university, we have established and led a consortium together with the Warsaw University of

Technology, Gdansk University of Technology, Wroclaw University of Science and Technology and the AGH University of Science and Technology in Krakow. Its main objective is to educate about 1,500 teachers in the field of algorithmics and programming to select the most gifted pupils among primary and secondary education students. 12 thousand young people will participate in the project. We will organize competitions and contests whose finals will take place in 2023 in Lodz. The IT Mastery Centre is another part of preparations for the implementation of the 5G technology, which correlates with the main purpose of the strategy announced by the Ministry of Digitization.

### **What opportunities and what hazards can arise as a result of introducing a new data transfer technology?**

It’s difficult to talk about hazards, but there are some opinions concerning the detrimental impact of higher frequencies on living organisms and the infamous SAR (Specific Absorption Rate) is often brought up, which is a measure of the radio wave energy absorbed by the user’s body when using a cell phone. When introducing the 5G technology, the frequency will, on average, reach 26 GHz (one of the proposed frequencies). It is necessary to build a dense network of masts and microcells (several hundred thousand throughout Poland) that will enable fast data transfers. I don’t see any hazard here.

Nevertheless, I am worried whether 5G will cover all the main cities and main transport routes by 2025.

I want to emphasize this: implementing these technologies will certainly result in an enormous developmental impulse for the economy, which can be unequivocally attested to, for example, by the figures I mentioned that indicate, among other things, that there is a demand for high-class experts.

### **You are very certain of this.**

For us, taking this challenge on is a civilizational necessity. We cannot lag behind the world. The 5G Strategy for Poland is a part of the European Union’s economic policy.

The process of building a knowledge based economy in Europe has led to the definition of key universities in Europe. Tentatively, two Polish universities have been classified in this group: The Jagiellonian University and the University of Warsaw. Each of the 20 facilities can invite four partners from Europe, so there is much to fight for. I believe we have a chance. As the Lodz University of Technology, we have been building a space for start-ups. We are

working closely with the Lodz Special Economic Zone, home to a 5G start-up accelerator. It is the most acclaimed economic zone in Poland, which makes us all the happier that all of this research and implementations will operate within our university.

**When will it be possible to launch the 5G network and how should you prepare for this, from the point of view of both the infrastructure and network security? What challenges stand in front of our country in relation to this?**

The global launch of the 5G network is planned for 2025. As a university, we have a scenario of operations prepared together with the Ministry of Digitization, the Ministry of Entrepreneurship and Technology and the Office of Electronic Communications. Prime Minister Morawiecki emphasized that introducing the 5G technology is crucial and strategic for Poland. Lodz will become the first city in Poland to introduce this technology. We have several partners here with whom we will do it and conduct the necessary tests.

Lodz is a good location for a pilot introduction. Here operate such institutions as the Lodz Special Economic Zone as well as such companies as Ericsson, Huawei, Nokia Solutions, Orange Polska, T-Mobile, P4, Polkomtel, Netia and Exatel.

**And what is the role of the Lodz University of Technology?**

Within two months of signing the letter of intent on cooperation with respect to the execution of 5G network tests in Lodz, we are obligated to prepare, in concert with the other parties, a detailed description of 5G network tests at the LUT campus. Thereto we will attach a proposition of precise uses and actions for each party along with a schedule. The University will also have to prepare the concept of tests and make its campus available.

Lodz is listed as the first pilot city, but it is obvious that tests, as is the case in IT, should be performed over a smaller area. The University campus is perfect for this. We own both the land and buildings. Therefore, as its rector, I can make autonomous decisions. If we take into consideration about 3,000 employees and 18,000 students, then our community makes up a district-class city of average size where we can manage real estate and utilities and where we can build installations. In this context, it is also very important to guarantee active participation of lecturers and students in the tests. The next task of the University consists of providing the

entrepreneurs – especially from small and medium enterprises – and start-ups the opportunity to conduct experiments related to application and solution services in a special 5G network test environment. Out of all participants of the project, the University has the largest amount of obligations, and we are very happy because of it.

The plan to implement the 5G network in Poland is also a part of the strategy of the Ministry of Digitization. We need to remember that, within the next few years, we will have to build the entire infrastructure providing the appropriate communication speed – this is a key condition for the introduction of this technology.

It is also necessary to undertake activities related to the security of data transmitted via the network. We know that the current technologies of 3G and 4G also require encryption; however, creating an encryption system for the 5G technology will pose a great challenge. Data streams sent with great speed require a new, more complex encryption scheme.

**Are pilot works already under way in Lodz? When can we expect the first results?**

As a university, we have been preparing to take appropriate action. We created a pilot plan and a scenario for introducing individual parts of the project. In partnership with Ericsson, we want to complete the first pilot installations at the campus before the end of this year. We specified locations where we will place the cell sites.

**Does the introduction of the 5G network require new legal regulations? What will these be?**

The 5G Strategy for Poland mentions the need of introducing new legal regulations. This concerns, among other things, the issues related to data security, encryption and transfer. Actions of the Minister of Digitization are very important in this regard. Appropriate legal regulations should be their result and extension of the entire 5G implementation process. The new generation of the 5G mobile technology must be safe, reliable and efficient, and the signal must be transmitted at much faster speeds. These are very difficult conditions for the safety, transmission and processing of data. It is also worth noting that this data is not made up solely of text data or character strings but of multimedia data and high-resolution images (e.g. medical data).

**Thank you for the interview. ●**



# Planning and deploying

Only a few years ago, 5G was dubbed the technology of the future. Today, however, we can see it deployed. By 2025 the 5G network will cover all major European cities. So far, it is commercially available only in Tampere, Finland and Tallinn, Estonia. Other countries, including Poland, want to follow suit.

“We are very pleased that Lodz has been chosen to carry out the pilot project for this technology,” says Robert Kolczyński, Head of the Project Management Unit in the Department of Architecture and Development at the City of Lodz Office. “On the one hand, it’s an enormous challenge for us and on the other, a chance to give a leg up to the city, the region and, in the future, to the whole country,” he adds.

The letter of intent regarding the implementation of 5G network in Lodz has already been signed. The Government was represented by Marek Zagórski, Minister of Digital Affairs, Jadwiga Emilewicz, Minister of Entrepreneurship and Technology and Marcin Cichy, President of the Office of Electronic Communications. Other signatories included: the City of Lodz, National Institute of Telecommunications, Lodz University of Technology, Lodz Special Economic Zone, Ericsson, Nokia Solutions and Networks, Huawei Polska, Exatel, Orange Polska, T-Mobile Polska S.A., P4, Polkomtel and Netia. All the signatories will have their share of responsibilities regarding the implementation of the fifth generation technology.

“Lodz will be responsible for analysing the demand for 5G based services in the city and for supporting the interested parties in launching testing installations placed in Lodz,” says Robert Kolczyński. “Our tasks will also include preparing a report summing up the tests as well as giving recommendations on how local governments could support the implementation process of 5G,” continues Kolczyński.

Perfect coordination and collaboration of all the parties are indispensable in this project.

“Public administration’s activities regarding 5G implementation must complement each other whereas private entities’ actions in this respect require coordination,” says Robert Kolczyński. “Obviously, the leading role belongs to the Minister of Digital Affairs,” he emphasizes.

Government institutions will be required to analyse the entrepreneurs’ demand for specific services based on 5G, prepare the legislation process and adopt necessary changes in the law that would allow to implement the technology and use it in the Polish industry. They will also provide radio frequencies necessary for the tests.

Lodz University of Technology will also play a vital role in implementing 5G. Since it is an academic institution it will, among others, prepare a detailed description of 5G tests in Lodz, suggest in what specific ways it can be used and will also work out how to test the network inside the University’s campus. As for Lodz Special Economic Zone, it will be responsible for engaging its entities to test specific solutions based on 5G.

The pilot project of the fifth generation wireless technology wouldn’t be possible without a close collaboration with network operators, who make the necessary devices as well as the whole infrastructure available for the needs of the tests. Moreover, specialists employed at the operators’ will provide an additional help in the process.

“The 5G implementation pilot project is thoroughly considered and its tiniest details are fine-tuned,” says Robert Kolczyński. “I believe that we will succeed,” he sums up. ●

BY KATARZYNA JÓŹWIK

# Robotics of the future

Until recently robots have been only associated with Schwarzenegger's role in the legendary *Terminator*. Today such automated solutions have begun to become a permanent feature of our daily lives, supporting us in various ways. One perfect proof is the Lodz-based backyard of young constructors whose innovative robots have been receiving prizes all over the world.

A manikin simulating an attack of epilepsy, tools that support severely disabled children or a robot that changes its face – these are only some of the inventions presented by the scientists from Lodz.

## NON-HUMAN THERAPIST

Robotherapy is one of the projects developed as part of the partnership between the Academy of Fine Arts in Lodz, Lodz University of Technology and the Navicula foundation. Its objective was to design devices and software supporting both therapists and parents in the rehabilitation and therapy of severely disabled children. As part of the project, several soft robots were created that can be used in the therapy of children diagnosed with autism. Their behaviour can be fully adapted to the needs of small patients. The option to choose the type of sound and its volume as well as types of generated stimuli provides a wide array of therapeutic possibilities. The idea of the invention is to make the children exhibit proper reactions to various types of stimuli that might normally frighten them or be ignored.

Another idea that provides varied activities of the therapist and child is a robot equipped with a sensory mat. The mat has a varied structure, controlled by sound and the robot's vibrations, facilitating creative activities and positively impacting the development of autistic children. Varied stimuli appropriately stimulate the



Igor Zubrycki surrounded by Kuka KUBE station robots

locomotor and nervous systems of young patients.

Another interesting solution is an interactive pillow that stimulates the child's body even when it's taking a break from exercise. The product's varied temperature, motion detectors that turn on light effects and vibrations, and the varied texture of the pillow constantly affect the resting child.

The Robotherapy project is supplemented by a concentration game. The set including colourful cards, headphones, a remote and the main panel supports teaching pronunciation to children. The game is also addressed to the group of patients for whom images are the only method of communicating with others.

Robotherapy is also the perfect proof that modern solutions can be confidently used to stimulate children's development. Friendly robots fully tailored to the autistic patient's needs become not just an interesting toy for them, but another tool used in therapy.

## EPILEPTIC ROBOT

Another project utilizing robotics for medical purposes consisted of creating a manikin simulating an epilepsy attack. This robot is a result of the partnership of the Lodz University of Technology and the Polskie Stowarzyszenie Ludzi Cierpiących na Padaczkę (Polish Association of Epilepsy Sufferers). Its main objective was to create a simulator of epileptic seizures that can



be used for educational purposes, showing teachers in primary and secondary schools how to handle their pupil's attack. However, when working on the robot, its creators have come to valuable conclusions. "This manikin is not just a training tool. Its shape, appearance and mode of operation can have a great influence on how the society perceives people with epilepsy," explains Igor Zubrycki from the Institute of Automatic Control at the Lodz University of Technology. "Therefore, the next step was to begin the research on how – according to the society – a human robot should look," he explains. To date, 217 teachers participated in workshops with "Walenty."

### INVENTION OF A HUNDRED FACES

Research on the appearance of manikins has led the scientists to the conclusion that people are open to co-creating their robots. But that's not the end: more and more people want to decide how such a robot should look. This was proven by the great interest in the exhibition entitled "Arts Work of the Future" at the London's Tate Modern where Igor Zubrycki and Honorata Łukasik presented a unique model of robot. Moving his head and eyes, the manikin named Marian changed its appearance according to the will of the visitors and the task of the audience was to decorate the robot so as to make it their representative. To this end, it could obtain various masks and additional accessories. "Our project proved that we want to decide how human forms of robots should look," explains Igor Zubrycki. "Interestingly, although our manikin was often decorated with country flags or colours of favourite football clubs, contrary to what might seem, people don't want to create their automated lookalikes," he adds.

The exhibition at the London gallery is just the beginning of the Lodz scientists' research on societal expectations concerning the appearance and behaviour of robots. The project will be expanded with the creation of a walking model of Marian. For many people, the manner of movement is also an important part of expressing themselves.

### NEW LIFESTYLE

The introduction of robots into the human existence seems inevitable, even more so since automated forms are already present in many areas of life. Talented students have been creating new robot designs appreciated by the international community. Last year, the Robotics Science Club SKaNeR from the Lodz University of Technology qualified to the finals of the Mohamed Bin Zayed International Robotics Challenge

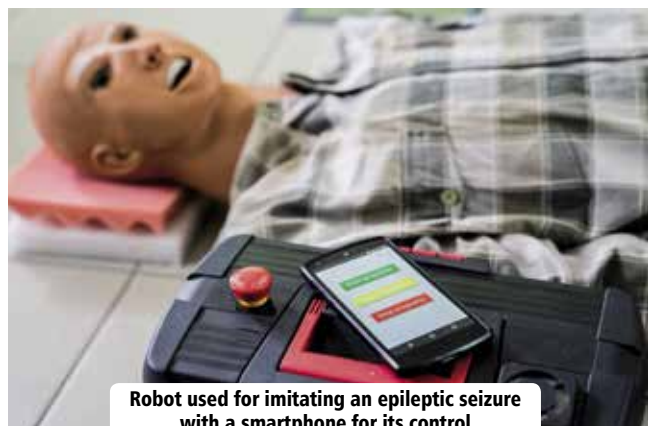


An anthropomorphic robotic hand, Schunk SVH, on a robot of the Kuka KUBE station

and thus found themselves in the group of the most talented inventors of mobile robots. In June, they placed fourth at the Martian rover competition University Rover Challenge 2018.

In addition to this, the Lodz University of Technology also obtained funds from the National Centre for Research and Development to design modular systems for advanced robotized stations with integrated inter-station transport. "Robots can support us in increasingly numerous areas of life," admits Igor Zubrycki. "However, their appearance and behaviour should depend on us," he adds.

Therefore, it would be proper to utilize the potential of the inventors from Lodz who want to develop the best solutions for both sides: robots and people. Everything so that they could become our best allies and provide valuable support in our daily lives. ●



Robot used for imitating an epileptic seizure with a smartphone for its control

Photo: Paweł Lawreszki

BY BOŻENA WIELGO

# Construction of the future



Intelligent building control systems have been present in the Polish market for a while. Such solutions have started to be developed and implemented a long time ago. Marek Pawłowski, PhD Eng from the Department of Electrical Apparatus at Lodz University of Technology predicts the systems' heydays are to be expected within the next five years.

The smart buildings project was launched by Lodz University of Technology ten years ago. Any building which is called intelligent must have a system responsible for integrating and managing most of the resources on site. But there's more. It is also vital how the users are affected in such a building. Essentially, a smart building should maintain a stable environment inside and make it easy to adapt the parameters to the changing needs of its users easily, provide full control and protection of the building's resources as well as enable a person to oversee how the property functions.

At the design stage, the crucial aspects to take into account are: efficiency, economy and ecology. It should therefore use as little energy as possible, be cheap to maintain and not pollute the environment.

"The construction sector comes right after the industry and transport in terms of final energy consumption. If building automation and intelligent

systems are able to cut down energy consumption by 20–40 percent, it's certain that such a sector will develop and will be supported by the government," says Marek Pawłowski.

## WISE EDUCATION

Such projects call for specialists — people who can integrate systems, plan everything and give relevant data to architects, designers and contractors. These exact professionals are born at Lodz University of Technology since 2015. They study intelligent building control systems — the first such course in Poland, the only one providing the title of an engineer in this area. The faculties collaborating in the project include: the Faculty of Electrical, Electronic, Computer and Control Engineering, the Faculty of Civil Engineering, Architecture and Environmental Engineering and the Faculty of Process and Environmental Engineering.

This year in June, the university opened a laboratory called Smart Home Grenton. Now it will be possible to incorporate in the curriculum the latest developments in intelligent building automation systems. The students will study the concept, learn to design and develop such systems.

Grenton is a leading designer and producer of innovative systems for smart buildings. "The Department of Electric Apparatus signed a deal with Grenton which obliges the company to equip the workstations and encourages internships, practices as well as working on graduation diplomas in collaboration with Grenton," says Marek Pawłowski, one of the men behind the laboratory. Additionally, from the university's perspective, it is important that the company became its partner and a consulting body because it provides the best feedback imaginable on the profile of graduates that are required in this sector," he adds.

### A THOUSAND OF GRADUATES

Smart Home Grenton laboratory is one of the elements of a project launched in 2008 at Lodz University of Technology. It was then that the current head of the Department of Electric Apparatus, prof. Piotr Borkowski started to work on intelligent buildings. Marek Pawłowski was the first PhD candidate interested in this topic at the time.

The first laboratory, which was created as part of the EU project, helped to educate more than a thousand students. In the following years, two more laboratories were built. "Smart Home Grenton is, therefore, the fourth one where students can be educated," says Pawłowski. "Such a solution benefits

both the university and its students as well as the company, which can collaborate with a teaching facility accentuating building automation systems so much," he adds.

The new laboratory is equipped with Grenton controllers which show the effects of implementing the system in a real life building. The students will gain very specialized and practical knowledge which will come in useful in their later professional life.

### INTELLIGENT SPECIALIZATION

The systems which intelligently control buildings teem with potential. Marek Pawłowski recalls that only ten years ago, the word *intelligent* was used rather as a marketing buzzword than a description of the systems' functions. "According to a dictionary definition, the word *intelligent* means the ability to learn new things and to react to them in a new way. When we started to work on building automation ten years ago, the word *intelligent* was an overstatement. Today, advanced systems managing a facility can make use of algorithms based on artificial neural networks and fuzzy logic. The systems which are introduced now into the market are capable of learning," says Pawłowski.

The dynamic development of intelligent building control systems means that the need for highly specialized professionals will be growing. The new field of study available now at Lodz University of Technology is therefore a response to the demands of the market. It's a challenging course of studies. Marek Pawłowski claims that this fact attracts very ambitious students who are better and better every year. The students who started their education in 2015 are now completing their sixth semester. When the university was recruiting for the first time, it accepted 60 students but only 18 of them have made it through so far. This supports the opinion that the standard of teaching and the demands are very high. "The season for internships is starting and we already see that the collaboration with our students is in great demand," says Pawłowski.

Intelligent building control systems is a field which complies with the ideas of smart specializations (Krajowa Inteligentna Specjalizacja) started by what was called in the past the Ministry of Economy. Smart specializations are about defining R&D and innovation priorities for the economy. Their aim is to transform the economy of Poland through modernisation, restructuring, diversification of products and services and creating innovative socio-economic solutions. •





From the left: Justyna Szumińska, Federico Navarette, Monika Milton, Roy Coughlan, Klaudia Iwanoska-Druszcz

BY BOŻENA WIELGO

# Professional support on the road to success

The competition “Youth in Lodz—I've Got a Start-Up Idea” has entered its next stage. Project teams have been preparing for the finals, where they'll present their innovative projects. They have been supported by a team of experts, including the Polish branch of Toastmasters, a partner of the 10th edition of this event.

Toastmasters experts meet the participants once every two weeks at exclusive workshops and teach them how to present their start-up ideas in the best possible manner before the Competition Jury, investors and internet users.

Toastmasters International (TI) is a dynamic international organization with established traditions. It was founded by Ralph C. Smedley, who created the first official speaking club in Bloomington, IL, USA. Its name – Toastmasters – reflects the term used back then and referring to a person who gave toasts at banquets and public speeches. The goal of the meetings was to prepare toastmasters to give the best speeches possible. With time, the clubs' mission became effective communication, development of leadership skills and team building.

The current president of Toastmasters International is Lark Doley, a member of the organization for 25 years

who, during her one year term, intends to promote Pathway, an educational programme available to all members of the organization and supporting their development in ten different paths.

## OPERATION IN POLAND

Toastmasters International has been operating in 142 countries worldwide and boasts over 352 thousand members. In Poland, over 19 thousand people are registered in 60 clubs of this organization. The largest advantage of the meetings is developing your own potential based on practical exercises and their constructive assessment. Participants, a general evaluator and a functional team comprising a timer, ah-counter and grammarian take part in each club meeting. Their role is to provide feedback to those speaking publicly. The meeting structure can vary depending on the club, but there are always three basic components.

One of them is the so-called prepared speech given by speakers. At the same time, they try to fit in the set time. Evaluations are another item. Each public speaker receives feedback about positive aspects of his or her speech as well as about areas that need improvement. The final part of the meeting consists of the so-called Hot Questions. The goal of the speaker is to provide a short one- or two-minute long answer to a hitherto unknown question asked by the Hot Question Master.

There are five different clubs in Lodz. The oldest one is Lodz Toastmasters, where meetings are conducted exclusively in Polish. Meetings in other clubs are conducted in English. The LeaderShip is focused on development in the managerial area. Speakers of Lodz aims its offer primarily at students. On the other hand, Lodz Business Speakers tackles business topics. All of the aforementioned clubs are open, and all interested parties are welcome to join them. The final club is Infosys Toastmasters, who is the only corporate club in Lodz, i.e. open only to employees of a specific company.

### DEVELOPMENT OPPORTUNITY

Training at a Toastmasters club is a very valuable experience not just for those who are just beginning their professional career but also for people who wish to develop. Perhaps this is why the potential present in Toastmasters meetings was noticed by Infosys Poland, the leading outsourcing, consulting and technology service provider. "By participating in meetings, we can express ourselves, but most of all we can listen to each other and accept feedback," says Klaudia Iwanowska Druszcz, finance and outsourcing processes trainer, author of the Toastmasters idea at Infosys Poland, TI member. "Members of our club emphasize that, thanks to regular training at the club, their self-confidence is better when making business presentations. By holding the role of a consultant, next to expert knowledge, they are more willing to use their listening skills, which gives positive results in communications with our clients as well as in daily contacts with team members. In addition to their experience gained at the meetings, our employees also appreciate their time, place and form. This is a dynamically spent hour during which one can learn much, and for many people – especially those with families, children or other obligations – this is the only opportunity to finally invest in themselves," she adds.

Taking advantage of Toastmasters knowledge and skills in the programme "Youth in Lodz – I've Got a Start-Up Idea" turns out to be a great help for

programme participants, who will have to present their project before several different committees at the final stage of the competition. The global history of Toastmasters and its rapid growth confirms the demand for such propositions. "First, we are a non profit volunteer-based organization, which means that, other than a handful of people employed at the headquarters, no one, not even the International President, receives remuneration for work performed as part of Toastmasters. Second, for a small fee, we give everyone without exception the opportunity to participate in our educational programme. The only condition is observing the code of ethics, which first and foremost values such qualities as respect and service. Finally, we are the largest educational organization in the world.

Our mission is to make people communicate better, easier and more effectively. I'm certain that this is the best manifestation of our social responsibility," says Piotr Chimko, director of the district managing the company's structures in five countries from Lodz.

Toastmasters has clear plans for the future. "We are continuously growing in the terms of both membership and the quality of our meetings. We are constantly perfecting our educational and training programme. We'd also like for the Toastmasters brand to become more famous and recognizable among employers in Poland, just as it is in the United States," summarizes Piotr Chimko. ●

---

**"Youth in Lodz – I've Got a Start-Up Idea"** is a competition with ten years of tradition, focusing on innovative scientific and technological as well as creative and artistic projects.

As part of the initiative, authors of promising projects participate in a six-month programme of training courses, consultancy, mentor guidance from experienced entrepreneurs, investors and VC fund representatives. The October finale for competition winners means financial and in kind prizes as well as services paid for by the President of the City of Lodz and the Sponsors.

"I've Got a Start-Up Idea" connects young businesses from different environments with potential partners and investors. It is a space for networking between young and mature businesses and an opportunity to accumulate capital to establish or develop a company.

You can learn more about the competition at <http://startupy.lodz.pl/>.



# Credibility in the digital world



Increasingly often and even more intrusively artificial intelligence has been interfering with our lives. The report prepared by Accenture Technology Vision forecasts that it will be the largest factor influencing business and human lives in the coming years.

Bożena Wielgo discusses changes resulting from the development of this advanced information technology with **WOJCIECH WALCZAK**, manager at Accenture Advanced Technology Center Poland.

**Each year Accenture has been preparing the Technology Vision report determining key technological trends.**

**Which of these trends will revolutionize the market in the near future and how will it translate to our domestic market?**

This year's report confirms that the trends we indicated in the previous years will continue to change our social and business environment. Accenture forecasts that the development of artificial intelligence (AI) will have the largest impact on business and consumers. In the report we draw attention to the AI business implementation process – to the way companies should find their place in this trend and avoid significant risks. This is because we have been observing how much the technology encroaches on the lives of people. Objects like the cell phone, computer or car don't just influence our lives but also determine it to a certain degree. Users provide companies with more and more information about themselves. One example is Alexa, an Amazon application popular in the West, playing the role of a virtual assistant who, at the same time, like other

such solutions, collects a large amount of information about us.

Another solution, also implemented by Amazon, is the Smart Key technology. It can be used by a courier company to deliver a package without waiting for the owner of the house because the courier can physically enter it. This is another example demonstrating just how much the technology interferes with our lives, and we agree to it. Because of this, Accenture emphasizes in its report how great the corporate responsibility is.

How does this translate to our market? Poland is no different from other countries. All consumer and business trends and technological solutions arrive in our country practically at the same time as in the West.

**The report forecasts an era of intelligent enterprises. What does it mean, exactly?**

Until now, Accenture has been stating that "Every business is technology business." This means that every company, regardless of its business profile,

becomes a technology or IT company because the role of IT in all businesses has been increasing in importance. In this year's report, we emphasize the fact that the integration of products and services with users and communities is so strong that we are entering a new level. Consumers ceased to be simply users of IT solutions and have become their co-authors. Current solutions enable us to receive user feedback practically in real time, which means that these products and services are, in a manner of speaking, created by the users. One example of this is Google Maps, an application that shows traffic jams. The more people use the service, the more reliable the data is. And this is the aforementioned feedback.

#### **What significance will the development of artificial intelligence have to the development of the economy?**

We have to analyse two aspects here. First, the availability of this technology increases thanks to the reduced costs of use. This makes the use of artificial intelligence increasingly common in the economy. Many such services are already available as complete platforms. Thanks to this, companies don't have to invest in infrastructure or hire data scientists who can develop such applications. You only need computer scientists who can integrate systems. However, in order for these systems to work and generate benefits, companies must possess well-prepared data. And this is often an issue.

Good data should meet several conditions. First of all, it should not contain any biases that might distort the entire analysis. This can be demonstrated using a simple example. If we want to teach an artificial intelligence to distinguish dog photos from cat photos, we prepare a data set, in this case of photos. And if cats are always photographed on a sofa and dogs are always photographed on grass, the artificial intelligence algorithm might learn to recognize grass and sofas instead of dogs and cats. This is a very simple example, but similar rules are used with respect to complex business data. Biases in data can result in incorrect forecasts. This can lead to erroneous business decisions or discrimination. In its report, Accenture draws attention to such risks and advises how to avoid them.

The second aspect in the context of economic development is automation. We need to be aware that implementing artificial intelligence means that certain tasks performed previously by humans will be taken over by IT solutions, which will, in turn, eliminate certain jobs from the market. It is easier to automate

simple processes, which can affect the economy in a certain manner, deepening the differences between poor societies dominated by simple work and rich societies where work is typically more complex.

#### **What are the opportunities and risks of the development of AI for employees? How to prepare them for this?**

I think that certain jobs will disappear, but new ones will be created in their stead. We shouldn't be afraid of this. We need to focus more on searching for certain synergies between the use of these technologies and human work. A good example is the application used to detect breast cancer, developed at the Harvard University. It turns out that the artificial intelligence algorithm is very good, reaching as high as 92 percent accuracy. However, humans are better with 96 percent accuracy. These figures show that artificial intelligence is already very efficient and begins to catch up with us. The most interesting thing, however, is that people using these algorithms reach an accuracy of 99 percent. This shows the direction we should follow. We shouldn't be afraid of excluding certain jobs but rather focus on searching for areas where human work, assisted by advanced IT solutions, will generate better benefits.

#### **How to build competitive advantage based on the development of technology?**

Companies that wish to compete using the technology of artificial intelligence must have good data. This requires changing their approach to new technologies and abandoning programmed systems in favour of learning systems. The market is changing very rapidly. On the one hand, new technologies and services keep appearing, more and more start-ups offering innovative solutions are being established. On the other hand, there are large companies on the market still using systems created tens of years ago that are difficult to integrate with new solutions. There is one conclusion: only companies that can quickly adapt new technologies will win.

Companies must be prepared for the possibility of providing and using APIs (application programming interfaces) but, at the same time, they should develop their services in a reliable and safe manner. Credibility, responsibility and trust are traits that should accompany us when using advanced IT technologies. And this is the main message of the Accenture Technology Vision report.

**Thank you for the interview. ●**

Modern artificial intelligence has been evolving in the direction of forecasting future market developments, consumer behaviour and attitude shaping. It can be used to predict stock prices just as well, facilitating the generation of profits for stock market investors.

BY RAFAŁ WILGUSIAK



# Stock market profits generated by artificial intelligence

AI Architects uses the knowledge and experience gained in long-term scientific work as well as one gained in commercial projects that build innovative AI-based solutions. It was founded by Michał Paluch, graduate of the Lodz University of Technology, doctor of technical sciences specializing in building artificial intelligence for data classification and prediction. "I work with Bohdan Szymczak, who spent 26 years working at the largest programming company in Central and Eastern Europe, building and developing extensive banking systems and managing large project teams. At AI Architects, he manages the software creation process and implements projects," says Michał Paluch.

## EFFECTIVE STOCK MARKET MODEL

AI Architects was established in July last year. Since the beginning, it has been operating at Bionanopark in Lodz. The company's name was invented by combining the words: AI, meaning artificial intelligence, and Architects, which indicates a desire to creatively take advantage of the possibilities of AI. "The purpose of the company is to implement artificial intelligence on the Polish market, thus increasing the competitiveness

of our companies in comparison with international corporations," emphasizes the head of the start-up from Lodz.

The adventure with AI began with the doctoral dissertation of Michał Paluch about the use of artificial neural networks (ANNs) to forecast stock prices. "With this, I combined my interests in economy and IT," explains Michał Paluch, PhD (Eng.).

In his scientific research at the Lodz University of Technology, Michał Paluch, PhD (Eng.) used technical and fractal analysis indicators. "On this basis, I experimentally generated data sets that were uploaded into MLP-type hybrid artificial neural networks (ANNs) which, after learning, generated the closing stock prices for the next close of the Warsaw Stock Exchange. During the subsequent step, the algorithm decided which stock prices will rise and generated an investor portfolio for the next session," he explains. With certain satisfaction he adds that the effectiveness of the model was 65 percent.

Artificial neural networks, thanks to their ability to find patterns in large quantities of data (even noisy), are able to forecast trends of many phenomena or



future behaviour (e.g. consumer decisions) by analysing data much more accurately and faster than humans. ANNs can answer a company with a certain probability whether it would be financially viable to establish a new store on street X in city Y, forecast the profitability of a construction company, or foresee when the traffic on the motorway would reach its peak, which then allows us to assess how many gates to open and when in order to avoid jams. "There are many uses for ANNs and the 'success' depends on many factors, primarily on the quantity of the client's data and the programmer's abilities and experience," explains Michał Paluch, PhD (Eng.).

AI Architects builds AI based solutions, including artificial neural networks.

AI Architects built an engine automating the aforementioned process named AI Engine. It is a program that builds AI (not just ANN) models based on results of studies published in scientific papers and the authors' original algorithms to best execute a given task without the need for programmer intervention.

The efficiency of artificial intelligence built using AI Engine was first demonstrated by the example of predicting stock prices using analytical and neural models. For 20 different investment portfolios studied, a return rate exceeding the return rate of the 2011 Warsaw Stock Exchange Index WIG by 194 percent was achieved.

### THIS IS PROFITABLE

Artificial intelligence has contributed to the new industrial revolution, comparable to the one that invented the steam engine. Polish business has been slowly accepting these changes. Many domestic companies search for the opportunity to use artificial intelligence in their business. "More and more managers are aware that, in the future, AI will play a significant role in reducing costs and increasing their profits. On the other hand, many corporate presidents are caught in the loop of thinking that additional tools require additional people and create additional problems."

AI Architects offers their clients the creation of AI-based applications, and the use of AI Engine cuts the time spent working on AI by as much as 25 percent. The latest version of the WSE stock price prediction application can be found at <https://aiengine.pl/aipredictor>, operating on the basis of LSTM networks built using the engine. AI Engine enables building AI for:

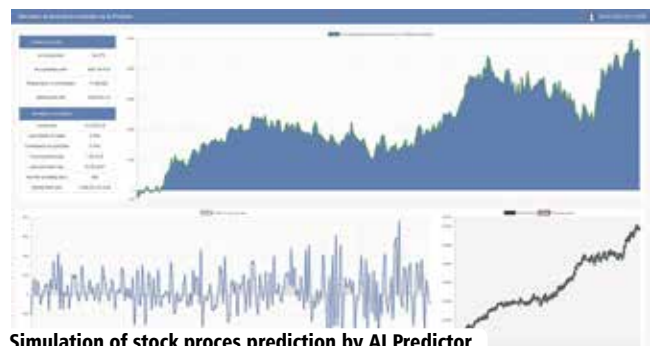
- data prediction (predicting values of indicators or the probability of occurrence of certain phenomena);
- profiling (e.g. customers);

- generating recommendations;
- classifying data (e.g. to detect abuse or irregularities in reports).

### GROWTH AND DEVELOPMENT PLANS

Although the company has been on the market for only one year, it already has its share of successes. The first one is its participation in the Start-up Spark project at the Lodz Special Economic Zone, the objective of which was to support start-ups pursuing commercialization. "Thanks to this, we had the opportunity to work with Ericsson Sp. z o.o. and create an ANN-based application for them," states Michał Paluch. In May this year, AI Architects and its AI Engine reached the semi finals of the nationwide competition ABSL Start-up Challenge. Last year, NVIDIA deemed AI Engine one of the most innovative products using artificial intelligence and enrolled AI Architects in its acceleration programme.

"The company intends to develop continuously. We are currently working on an AI-based e-commerce application, and we plan to expand our business with a service for recruiting highly qualified programmers with broad experience for international projects, whom we will first train with respect to the practical use of AI," states the head of AI Architects. ●



Simulation of stock price prediction by AI Predictor

Artificial neural networks are sets of linked data processing elements that communicate with each other. Their structure and operation resemble a simplified model of the human brain. Each artificial neural network, before being applied to actual data, is first taught and tested on historical data related to the context of a given task.

Finding "the best" ANN is an iterative process composed of several steps: specifying input parameters, selecting the network architecture and its parameters, learning and tests.



From the left: Reza Shahla, Aldo H. Schurmann, Jacek Chrzanowski

BY KATARZYNA JÓŹWIK

# We design emotions

They started barely two years ago and already compete with largest designers in the world. The company specializes in designing self-driving cars, but the members argue that their work is about something more than just a functional shape. Their projects are an offspring of emotions and feelings awakened while working on the concept.

One One Lab is a design studio set up in 2016 by graduates of Istituto Europeo di Design in Turin. One of the members is Jacek Chrzanowski who graduated from the Strzeminski Academy of Art.

## INTERNATIONAL ENVIRONMENT

What is so characteristic for One One Lab is the international context in which the company operates. And that includes both the customers for whom they design as well as the studio's members. Apart from Jacek Chrzanowski, other authors of the Lab's innovative projects are Aldo H. Schurmann from Mexico, Reza Shahla from Iran and Sunny Ramrakhiani from India. Each of them contributes creative ideas and precious expertise in the car design industry. They gained their experience in such places as Daihatsu Designer Center, Pininfarina, Suzuki Italia, FF Design Studio and Geely Motors, which equipped them with great tools to develop new and unique solutions.

Such unconventional approach is appreciated by an increasing number of people. "We collaborate with foreign customers, mainly from the US and from Asian countries (Vietnam, Kuwait, India)," says Jacek

Chrzanowski. "We will be building the prototype of an electric bicycle with our partners from India".

## THE SYNERGY OF COLLABORATION

Their valuable experience is not the only asset of the team. The ability to collaborate is another one. One One Lab means more than a batch of experienced designers. They all agree that because they work together on exceptional projects, they became close friends. "We're something else than a group of indifferent people or colleagues. We're almost like a family," says Aldo H. Schurmann and then adds "Commonly, the projects consume many hours of work peppered sometimes with squabbles and jokes. Like in a typical family".

The rapport in the team enhances the results of their work. The one to keep an eye on everything is the Polish designer. "Everybody in the team knows that whatever query you have, you can come to me and we'll try to find the solution," admits Jacek Chrzanowski. "But still, we all complement each other. Frequently, all the members work separately to submit the first version of a design in order to be able to choose the best solution," he adds.

The studio uses organic marketing and tries to make an optimal use of its resources.

## NO BARRIERS

As they were working in foreign car companies, the designers realised that they could work on innovative solutions from every corner of the world. Although the office is based in Lodz, One One Lab's projects win acclaim around the globe. The team welcomes both overseas customers as well as teammates. "Car designers are still quite a hermetic group. People from all over the globe often ask us if we take on interns. That's how we can collaborate with stylists based in various locations (Italy, China, Israel, India). Yet, we never stopped seeking to partner with talented people," admits Jacek Chrzanowski.

The scope of their designs is also unconstrained. Depending on the customer's needs, it can include only a visualization, creating a virtual model or a real-life demonstration model. One One Lab is flexible when it comes to the wishes of the company's customers and the team strives to fulfil the vision of both: the customer and the designer.

## PROJECTS FRAUGHT WITH CHALLENGES

One of the greatest accolades for the studio was the privilege to collaborate in designing an electric city vehicle with the doyens of car design – Pininfarina, Italdesign Giugiaro and Torino Design. One One Lab's role was to prepare the drafts of the cars. The company is still monitoring the progress of the project.

An important distinction for the team is the fact that it was recommended to VINFAST, a Vietnamese company. "The recommendation in itself was a turning point for me because it proved that we began to be treated on a par with the big design studios," admits Jacek Chrzanowski.

However, the project for the Vietnamese company is not the only one in the team's portfolio. One One Lab has already designed an electric UTV vehicle for Nikola Motor. The Lab also designs small-sized products. Presently, they are negotiating yacht design projects too. What's more, the studio is also working on an electric bus concept for an overseas customer.

## DESIGN AS ART

One One Lab chose an industry that offers multiple possibilities. The market is oriented towards electric vehicles and here the mechanics is not the only crucial element. The design plays an equally important part too. This opens the door for the designers to show off their creativity. The customers who want to own a product

of the future expect futuristic shapes. "The companies we collaborate with demand creating an entirely new aesthetics for their products. This is a delightful challenge for us," says Jacek Chrzanowski.

He himself claims that the design process goes beyond developing the functional concept. Although Chrzanowski doesn't pinpoint exactly what inspires new ideas in him, he treats designing as art – the kind of art which reflects the emotions that accompany him when he's working on a given product.

## FROM PUPIL TO MENTOR

The extent of the success achieved in recent years by this Lodz based studio is reflected in the status of One One Lab in the international design market and the achievements of its individual members. Aldo H. Schurmann won the "Alfa Romeo L'energia si Trasforma in Emozione" award and as for Chrzanowski, he succeeded in many national and international competitions, e.g. Electrolux Design Lab. One One Lab was also appreciated two years ago in "Młodzi w Łodzi" competition. And now, here we are again, but this time Jacek Chrzanowski is one of the mentors in 2018 edition. "One One Lab is on very good terms with the City of Lodz Office. I'm glad that we can serve as an example to others," says the designer.

The team appreciates its current position in the design industry. The members are set to follow the latest automotive trends and to specialize in creating beautiful and utilitarian projects. ●



The new wireless network standard, called 5G will enable faster communication and greater network capacity. Experts claim that it will trigger a technological revolution. The changes will affect many sectors of the economy. New perspectives will turn up for the production sector, energy distribution, public security and even for transport and health protection.

By BOŻENA WIELGO

# A life-changing technology

In line with the strategy adopted by the Ministry of Digitization in January 2018, Lodz will be the first Polish city to launch 5G network. This technology will be used by smart buildings, to detect free parking space, in innovative lighting system, local apps supporting the inhabitants, electronic traffic control system and real-time air quality map.

## CITY MANAGEMENT

Lodz is already making preparations to deploy the fifth generation of wireless technology. Assec Data Systems is a company specializing, among others, in solutions for what is known as intelligent cities. With 5G in mind, they developed "Metropolis", a platform to manage the city. "It is characterized by three basic elements: data gathering and exchange, predicting problems and minimizing their negative impact as well as coordinating resources," says Robert Kobylański, Vice President of the Management Board at Assec Data Systems.



Robert Kobylański, Vice President of the Management Board at Assec Data Systems



The first 5G demonstration in Poland has been made on Ericsson hardware and software

Cities can use the platform in such areas as: greenery, security, environment, ecology, transport, lighting and traffic. "Metropolis" is so functional because it harnesses an integrated network of street lamps to work as multipurpose sensors gathering information about, for instance, carpark traffic and the levels of pollution," says the vice president.

An exceptionally important tool for implementing the smart cities concept is the Internet of Things (IoT), which enables the user to connect multiple devices and sensors, e.g. detecting movement or measuring footfall. "We are convinced that the development of 5G technology will fundamentally expand the technological potential of mobile services and thus contribute to a more efficient use of solutions created for intelligent cities," says Robert Kobylański.

## CLOUD NETWORK AND 5G ECOSYSTEM

The deployment of 5G technology is an opportunity for Comarch, IT solutions provider and producer which also supplies software to biggest global operators, to manage their telecommunications networks.

The fifth generation technology is a trailblazer offering an entirely new approach to network configuration and sharing of its resources, i.e. transferring files. Moreover, 5G will facilitate the integration of various access network technologies. It is a 5G SON (self-organizing network) which takes into account exact user needs and specific apps.

It will also provide access to the data and logic of distributed applications, i.e. applications or software

that run on multiple computers within a network at the same time. Accessing the data is perceived as a real-time experience because of the ultra-low latency taking only milliseconds.

People might not be able to fully feel the difference 5G makes yet, but surely Internet apps, the media, advertising, devices, sensors, autonomous transportation, telemedicine and modern robotics can make use of it. Thus, 5G opens the door for millions of new users and new needs. What is being created is an ecosystem based on software-defined networking.

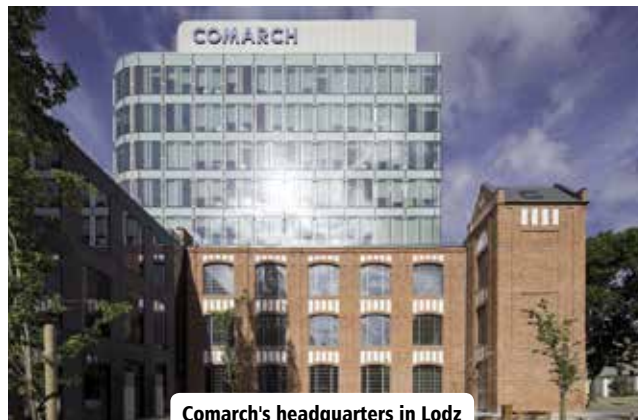
Managing this type of network requires new, open data concepts, microservices based system architecture and cloud computing (like those used by Facebook and Google). Such management also calls for using machine learning algorithms in order to predict network condition. Owing to this convenience, it will be possible to fix or reconfigure the network before the problem starts to affect the whole ecosystem.

“This is the way present day design and development of Operations Support System (OSS) for virtualized networks and 5G looks like at Comarch R&D departments,” says Piotr Machnik, Senior Technical Consultant OSS at Comarch. “One of our projects which meets the new requirements imposed by 5G network is an entirely commercial deployment of Comarch Operations Support System solution. This project is carried out for LG U+, a Korean operator who aims to launch the first commercial multiple access 5G network in the entire country. The fifth generation network is happening right now and we should bear that in mind when we talk about its deployment,” he adds.

## KNOWLEDGE REQUIRED

In order to fully grasp the possibilities which 5G technology offers, it is necessary to acquire certain amount of knowledge. And that is the challenge undertaken in July 2018 by Ericsson, which signed the letter of intent with Lodz Special Economic Zone and Start-up Spark Accelerator regarding the support for small and medium enterprises in developing 5G based solutions.

“We are aware that the success of such accelerators as S5 depends on how much is known about 5G among inhabitants, entrepreneurs and organizations in Lodz. Hence, our programme includes trainings on the subject and will guide selected initiatives to help them deliver commercial implementations for the inhabitants of the Lodz



region in the future,” says Martin Mellor, Country Manager Ericsson Poland.

The way companies operate as well as the way average people live will undergo a profound change with the advent of 5G technology. “A countless number of sensors around you, network bandwidth of several gigabits per second, latency shorter than the time human brain needs to react—all this will help us see the world in a different light,” says Marcin Sugak, Account Director at Ericsson. “Real-time analytical systems and intelligent machines will make it possible to detect any malfunction sooner and to autonomously decide to take instantaneous action. The effect will be increased efficiency and optimized processes. Augmented reality and virtual reality will facilitate the learning process during trainings and the adaptation to new circumstances,” he adds.

Ericsson showed the first live 5G demo in November 2017, whereas first network tests the company is planning to carry out in the beginning of 2019 to be able to launch 5G a year later, in 2020. Moreover, in line with EU guidelines, five years on, all the major cities and traffic routes will gain access to 5G as well.

In contrast to previous mobile networks generations, 5G technology is capable of constructing new business models and expanding the operators’ offer for the industry, companies and consumers. This cutting edge technology will empower telecommunications operators to provide new services in collaboration with the industry (e.g. mining businesses will be able to use self-driving vehicles to work underground), universities (they will be able to teach students online and making use of haptics) and local governments, which will be able to use IoT to ensure e.g. a more effective waste disposal and security of inhabitants.

All this is viable because we will be able to increase the capacity, flow, accessibility and resources control. At the same time, we will send signals much faster in comparison with previous generations of networks. ●



BY BOŻENA WIELGO

# City of great perspectives

A good image of a city and region means a greater opportunity to attract investors. Local authorities increasingly often reach for proven tools to improve a city's attractiveness and increasingly more consciously take advantage of the possibilities of territorial marketing.

Lodz is a praiseworthy example, having begun a unique nationwide promotional campaign "Mobile Lodz" in mid-August this year.

## ON THE WAY

A colourful multimedia car with a unicorn painted on it will visit 30 cities throughout Poland within three months. They will include cities located far from Lodz, like Gdansk, Gdynia and Bialystok, as well as the most important cities of the region, including Pabianice, Lowicz, Kutno, Piotrkow Trybunalski and Sieradz. The tour will also include Kielce, Czestochowa, Plock, Torun and Bydgoszcz, with Warsaw being the mobile vehicle's final destination. The event is planned to begin on 30 October.

## AN INTERESTING MESSAGE IN AN ATTRACTIVE FORM

A special vehicle was designed to bring this exceptional information campaign to life, with the

ability to increase its cubic volume at a stop and create a spacious, modern and comfortable interior. In 37 square metres of mobile exhibition space, equipped with multimedia devices, each guest will be able to independently search for interesting information. Should he or she wish to know more, animateurs will provide the answer. They will also take care of children, so the parents will be able to learn about the offer of Lodz while their children take advantage of the activation zone.

"Good recruitment practices" workshops will be conducted at each location by a recruitment expert. Guests will be able to test their knowledge about Lodz by using the multimedia screens set up inside and solving a special quiz. At the table with the multimedia screen, there is a map with marked buildings worthy a visit when in the city, as well as those important from the point of view of people who think about moving to another city; in other words: tourist attractions and places of entertainment, hospitals and schools.

There is also a possibility of learning about people who have already decided to move. Visitors can watch short clips with employees of Lodz companies describing their life in the city.

A competence metre is an interesting tool. After entering general data about yourself, such as age, education, work history and previous experiences, you will be able to learn which companies in Lodz would be interested in getting to know you.

A colourful friendly vehicle invites you to see what's inside, and the painted unicorn attracts the attention of children as well as adults. The idea for the motif of a unicorn on a bus has its story. Several years ago in Lodz, a colourful bus stop with a stained glass roof was built; the residents of Lodz call it a unicorn stable. The place is well liked by many residents and has positive associations, so the campaign organizers decided to take advantage of this fact. In the near future, a unicorn monument will be created in Lodz as well. Japanese artists have already begun making it.

## FRIENDLY CITY

The campaign, initiated by the Investor Service & International Cooperation Bureau, constitutes an answer to the needs of the labour market in Lodz. Its purpose is to build the image of Lodz as a friendly city

to work and live in, as well as to present employers from Lodz.

"We want to defy stereotypes about our city and show its modern potential while encouraging young people from other places in the country to study there, look for work and a space to live. We present a new face and image of Lodz as an attractive city, offering many development and career opportunities, evoking positive emotions," said Hanna Zdanowska, the President of Lodz.

The campaign is an element of promotion of the Lodz region. Knowledge about the potential and business offer of Lodz companies is not common. "Another goal of the campaign is to show Lodz as a city not just from the perspective of statistics and figures that confirm its attractiveness, but also from the perspective of the high quality of life, evidenced by the city's unique architecture, numerous events and festivals," says Agata Ślusarczyk, head of the Investment Marketing Department at the Investor Service & International Cooperation Bureau, City of Lodz Office.

"We don't need to spend millions to reach our marketing goals. It is known by cities and regions that increasingly often execute their promotional activities consistently and in a deliberate manner: territorial marketing has finally entered its mature phase," said Robert Stępowski, expert on territorial marketing. And this statement is the best summary of the activities undertaken in this regard by the authorities of Lodz. ●

The informational and promotional campaign "Mobile Lodz" is executed as part of the project "Economic internationalization of Lodz region companies through dedicated promotional activities and territorial economic marketing," co-financed from the European Regional Development Fund as part of the Regional Operational Programme for Lodzkie 2014-2020.

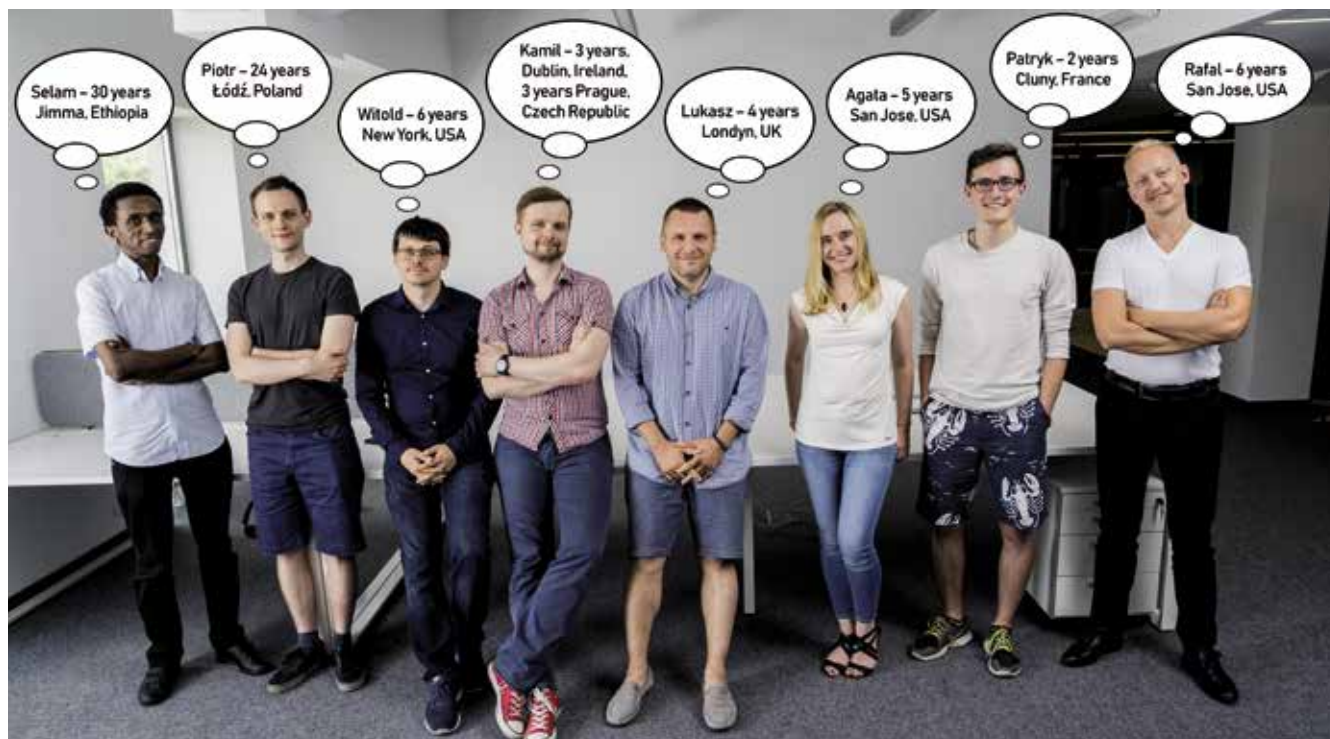


The interior of the bus

Photo: City of Lodz

BY BOŻENA WIELGO

# A self-improving system



Nowadays, artificial intelligence and machine learning are the most rapidly growing branches of knowledge. Machine learning combines IT, robotics and statistics. Its main assumption is the practical use of artificial intelligence to create an autonomous system that will improve on its own using collected data.

Universities and courses can provide theoretical knowledge, but comprehensive knowledge and skills in implementing artificial intelligence can be gained only by tackling actual problems in the commercial reality.

## IN THE SILICON VALLEY AND IN LODZ

Precisely such an innovative approach to business is demonstrated by Enigma Pattern, a company established in 2017 with seats in San Jose, the capital of Silicon Valley, and in Lodz. Work in international environments, including in the Silicon Valley, made the company founders realize an ever-increasing need for new solutions from the area of artificial intelligence and machine learning in many aspects of industry and life.

The sales arm of the company operates in the US, focusing on customer service and project management. This provides Enigma with the opportunity to work

with the most interesting companies in the world. Thanks to the Lodz – Silicon Valley connection, people living in Lodz have the opportunity to work on the most interesting projects, while companies from the most technologically developed place in the world get access to the best talents in Poland.

The executive arm of the Company operates in Lodz. Data Science specialists work here on the use of artificial intelligence to analyse big data – large, variable and diverse sets of data. The Polish centre of Enigma Pattern is crucial for the company's development. It is a group of the best specialists and enthusiasts who create and develop artificial intelligence-related technologies.

All founders have ties to this city. Mike Gibbons is the founder of Teleca Lodz and Mobica Lodz. On the other hand, Rafał Janczyk, graduate of IT and



econometrics at the University of Lodz, is a co-founder of Mobicca Lodz and the COO of Mobicca Inc. in Silicon Valley, where he spent the last five years gaining experience and developing his career. In May this year, he moved to Lodz to work on artificial intelligence along with the entire team.

Łukasz Kuncewicz was born and raised in Lodz. He has been programming since he was seven. He is a laureate of an IT Olympiad and the author of books about mathematics and neurolinguistic programming. Nowadays, he is perceived as one of the three greatest experts in Data Science in Poland. After ten years of work in London and Warsaw, he returned to his home city to continue working – like his colleague – on the development of artificial intelligence.

## THE POTENTIAL OF DATA

Enigma Pattern uses its own platforms and techniques with additional data sets, which help clients find hidden patterns in their data.

“Our ambition is to help clients understand and learn the best way to use their information,” says Łukasz Kuncewicz, Head of Data Science at Enigma Pattern. “In business processes, we use artificial intelligence and machine learning because such an innovative approach helps finish projects faster and achieve the highest result precision,” he explains.

The founders of the company want to create the first Polish brand recognizable worldwide as directly connected to artificial intelligence. Their first step is already behind them: they have assembled a unique team that can utilize the potential of artificial intelligence.

“Enigma Pattern will help its clients extract the potential from their existing data as well as enrich their software and processes with artificial intelligence. At the next stage, our team will invent, create and patent its own AI-based products,” says Rafał Janczyk, Chief Executive Officer at Enigma Pattern.

The company’s mission is to utilize the existing processing power and current developments in the use of artificial intelligence to improve our reality and optimize human life. “We believe that our world contains sufficient resources for our civilization to develop dynamically and peacefully; however, their unoptimized use is an issue. Some of such problems can be solved with AI,” says Rafał Janczyk.

The company’s name is not accidental. Its first part refers to the history of breaking the Enigma code by Polish and British mathematicians. This is an incredible legacy that contributed to the development of modern IT.

On the other hand, Pattern is justified by the fact that working with data science and large sets of data, as well as machine learning, distil down to the search for patterns by computing machines. Thus, Enigma Pattern “references the tradition of Polish mathematical and computer science, including the work on the Enigma cipher machine,” summarizes Łukasz Kuncewicz.

## RESPECT AND ETHICS

Currently, the team of Enigma Pattern has been preparing a unique machine learning method for recognizing objects on the basis of synthetic images. “This is somewhat of a revolution because it will enable us to cut down the learning time and significantly reduce its costs,” says Rafał Janczyk. “Its uses will include the protection of dying species of animals in Africa. Thanks to the possibility of recognizing objects from drone photos, we will be able to create a rapid alert system for poachers in the areas where the animals live,” he adds. “Our projects help ‘teach’ autonomous vehicles to recognize road signs worldwide, which brings the moment of their common introduction significantly closer. In telecommunications, we create models that can forecast and prevent network or individual device failures. Because of all these projects, the team feels the need to improve the existing world by using artificial intelligence.”

Working on these projects demonstrates the values of the founders of Enigma. One of them is respect. “This value affects the way we work as a team, the way in which we recruit and how we perceive the world and our environment. We observe universal ethical values, so that everyone who is a part of our ecosystem feels judged and treated in a way consistent with their skills and achievements,” says Łukasz Kuncewicz.

It is worth emphasizing that, even though both founders could develop their careers practically anywhere in the world, they nonetheless chose Lodz. They have the ambition to create such conditions in the city, so that artificial intelligence enthusiasts would not need to emigrate to other countries in search for the most interesting projects. Lodz will be a place that creates the opportunities for professional development. So far, finding people with strong-but-so-far-rare qualifications is a big challenge. The company is intensively looking for specialists among the residents of Lodz, but it also recruits employees from abroad – Dublin, New York, London, San Jose or even Ethiopia. Currently, Enigma Pattern employs 20 people on two continents, but its plans involve establishing a 50-person team by the end of 2019. ●

BY BOŻENA WIELGO

# No risk of errors

Automation of business processes is becoming an increasingly common solution. Wherever work is tedious and repetitive, a digital worker can help a human employee.

Digital Workforce, a Scandinavian company founded in 2015, conducts such operations. In 2017, it opened an office in Lodz, which goal was to support clients from the Nordic countries, operating service centres in our country. However, it quickly turned out that Poland gives many interesting business opportunities.

## A MARKET WITH GREAT PERSPECTIVES

Digital Workforce Services recognised our country's potential and decided to expand its office here. In Lodz, and in its vicinity, there are many large public and private that develop rapidly and implement automation solutions. Banks, financial institutions, insurance companies, health care centres, shared services, BPO companies (Business Process Outsourcing) are all interested in using our digital employees. Universities are not far behind either, attracting people interested in cutting edge technology. It's worth noting that since 2017 the company has accepted over 40 technology enthusiasts and received the FDI Poland award for the Best Investor from Scandinavia.

At the moment, Digital Workforce's Polish branch serves over 20 customers, mainly from the Nordic countries, but also from Poland. These include banks, financial institutions and insurance companies, as well as a telecommunication company, the city council and other national institutions. It seems that digital employees are a good fit in any organisation.



Kinga Chelińska-Barańska, Country Manager

## HIGHER EFFICIENCY AND LOWER COSTS

“Automation of processes assured by digital employees has become a widely used solution in many industries,” explains Kinga Chelińska-Barańska, Country Manager in Digital Workforce Polska. The biggest advantages of this technology lie in its quick implementation, complete elimination of errors, increased efficiency and a high level of satisfaction of the final customer. In addition to that, such software meets all safety standards. On the one hand, the robot doesn't remember or store any data, while on the other hand no unauthorised person has access to the passwords used by the robot.

The term “Robotic Process Automation” refers to the use of a special computer software, a so-called digital worker, for business process automation. This

virtual worker takes on selected tasks, e.g. tedious, repetitive activities, what allows a human to devote time to more valuable work. "Managing the effectiveness of knowledge-based work is right up there on the list of management's tasks, as it's the most important factor in terms of productivity today. This holds true in almost all industries. Changes occur incredibly fast and the amount of knowledge-based, necessary routine work is growing rapidly," says Heikki Länsisyrjä, co-founder of Digital Workforce, "Many of us simply spend an excessive amount of time doing things that neither reflect our skills, nor serve company's purpose, that is creating value for the client."

Process automation is not an expensive solution, as it's based on applications already used in companies. No changes to existing IT systems or security policies are required to implement the system. Digital workers work just like people, but – as Kinga Chelińska-Barańska observes – they are much faster, work 24/7 and eliminate the risk of human error. As she explains: "This solution allows one to reap benefits comparable to outsourcing, but with greater control over processes, as they stay within the organisation."

## INTRODUCTION TO ADVANCED TECHNOLOGIES

Robotic Process Automation (RPA) prepares companies for using a wide range of increasingly advanced technologies in the near future. In most cases, RPA serves as the foundation for further opportunities, depending on the specific requirements of target processes. The implementation and proper management of this solution is therefore a sine qua non key to increasingly wider process automation in the future.

It's also the most affordable and the fastest solution for the client. In other words, it's an excellent tactical tool for achieving business benefits. Meanwhile, the next step in digitisation should be the development of cognitive automation, machine learning or, as the final goal, artificial intelligence. That's why Digital Workforce offers solutions based on various technologies and each service is implemented for clients with passion and excitement.

## EDUCATION AND PRACTICE

The Lodz branch of Digital Workforce is expanding its operations, employing and educating more employees, and is not limited to process automation. It also implements technologies such as Intelligent Process

Automation (IPA), Cognitive Automation, Machine Learning and Artificial Intelligence (AI).

The company is divided into three competency sectors. The first includes experienced consultants who help clients implement digital solutions. The second helps maintain the implemented solutions. The third one, the RaaS (Robot as a Service) team, provides comprehensive support for the entire environment in which robot farms are built and made available to customers as a service.

The Lodz-based company shows its customers how RPA can reduce operational costs, improve business process quality and effectiveness, and enhance the employees' focus on the company's key strategic tasks.

Moreover, the company provides digital workers in the cloud, which means that the solution is ready for immediate deployment and the results can be observed after just a few days. The introduction of an already built and optimised cloud service is even simpler and faster than using an "on premise" solution based on the customer's servers. The cloud also allows the service to be replicated and modified.

"Since RPA is fast and cheap to implement, it can improve a company's business flexibility, enabling management to test new ideas and implement plans that wouldn't be possible with traditional IT architecture. One digital worker can be configured to perform several processes, so when it finishes working on one, it can start on the next one immediately, without any rest," explains Kinga Chelińska-Barańska,

"Another important aspect is that RPA not only helps to reduce costs. Above all, it gives the chance to



look at one's own processes from a different perspective. Digital Workforce was created to do precisely that—help customers better understand their automation needs, clarify their strategic vision and help combine products and services, so that they can best serve internal and external clients, in the most efficient manner possible,” Kinga Chelińska-Barańska says.



**Piotr Maciejewski, Key Account Manager,  
Digital Workforce**

Digitisation, automation, and robotization are trends that are entering new areas of our lives ever more boldly. In the era of such technological progress, digitisation of business processes is becoming the norm. Digital Workforce sees incredible potential on the Polish market. We help entrepreneurs optimise human resources, freeing them from tasks that can be entrusted to digital workers. Our solutions are effective in companies and institutions operating on

Complex IT systems require a lot of work and repeatability in entering data. Transforming them by means of integration projects, integration mergers, outsourcing or implementation of corrections can be very time-consuming, and in effect exorbitantly expensive. A digital worker is a more economical, faster and flexible solution that eliminates expensive and long upgrades. ●

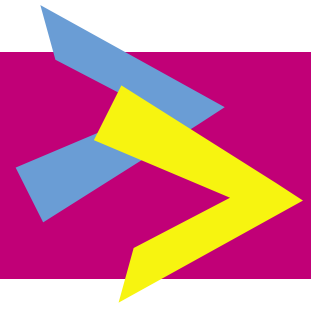
large data volumes, which are processed as part of their business processes. Wherever data is processed and collected, people can be replaced with a robot that will do the same job faster and without errors, which benefits the employer.

The implementation of digital workers is preceded by an analysis aimed at establishing the areas of the organisation where they could be applied. The customer determines the Key Performance Indicators (KPI) they are focused on, which processes take up most of employee's time and where to find the most data to be processed, or which processes are critical and need increased error resilience. Then, we choose processes for automation and after a few to several weeks we're ready to show the resulting benefits. Our solutions allow certain tasks to be performed at least twice as fast and in the case of longer projects, when we add more automation solutions, the customers achieve significant savings and financial benefits. We believe that proper automation implemented in an organisation should be earning its keep in a short time. That's why we put great emphasis on making our customers' return on investment in our robots as quick as possible—a few months.

In addition to creating and implementing digital workers, we support our customers in employing these solutions. We make sure that the robot works flawlessly and adjust, if the process needs to change. We also provide our customers with training, allowing them to develop, maintain and implement subsequent robots in their organisations in the future. ●

BY BOŻENA WIELGO

# Flirting with business



The 10th anniversary edition of the competition “Youth in Lodz—I've Got a Start-Up Idea” is under way. In comparison with previous edition, in addition to mentoring for participants, it also offers, among other things, investor speed dating.

Project teams that qualified to the second stage of the competition participate in training courses, work with mentors and prepare presentations for the jury to assess. They constitute a community that creates new innovative solutions. Participants who gained knowledge and experience during previous editions help with the organization of subsequent ones. Such activity results in a distinctive continuity of the initiative—by committing to organizing the event as well as to sharing their knowledge.

## **PARTICIPANT TODAY—SPONSOR TOMORROW**

The competition supporters include, among others, Tomasz Cichowicz. In 2011, after graduating from a university in England, he returned to Poland to start Webwerx in Lodz. That year, he participated in “Youth in Lodz—I Have an Idea for Business.” He says: “It was a perfect opportunity to review my business plans free of charge and discuss them with experts. This was the only way to obtain valuable feedback and avoid potential costly mistakes in the future. Besides, the winners were to receive attractive prizes that would significantly make the initial period easier for a new company.” He sees his participation in the competition as a valuable experience—so good, in fact, that he decided to support this initiative as a sponsor two years later. He views the commitment and support of the organizers as particularly praiseworthy, making the competition better and better. Knowledge and experience that can be gained by participating in this type of event

are priceless as well. It turns out that it is the first opportunity for many entrepreneurs to test their skills and capabilities—without consequences and with potential benefits.

## **NEW STRUCTURE**

Experiences from previous editions demonstrated how to expand the structure of the competition so that its participants can gain even more from it. This time, mentoring turned out to be a perfect candidate, praised not only by the mentors, but primarily by the participants.

Tomasz Cichowicz indicates three key changes introduced to the competition since he was a participant. “While at first prizes were awarded to business plans, now participants have to go one step beyond and think about their company as a start-up. Just five years ago this term wasn’t commonly known, but today it’s very catchy and well suited for event promotion,” he adds.

Another positive change is mentoring. “There is nothing more valuable than the opportunity to discuss your business with someone who has already run their own company, or with an industry expert. Often access to such resources is limited or costly. In case of such initiatives, not only does the entrepreneur receive it free of charge—they can also choose among a wide variety of mentors,” concludes Tomasz Cichowicz.

The third aspect pointed out by the mentor is investor speed dating, which gives entrepreneurs an opportunity to obtain funding outside the



UNIVERSITY OF LODZ  
Centre for External  
Relations



**VC SPEED DATING**

**I've Got a Start-Up Idea**

**OCTOBER 18, EXPO-LODZ**

competition. Speed dating became an inspiration for business in late 1990s. Speed dating provides an opportunity to meet many interesting people from various professional environments in a short period. And business is based on interpersonal relationships as well! Planning meetings with a dozen or so entities would require substantially more time. Many experts say that if someone cannot sell themselves or their business idea within several dozen seconds, no multi hour presentation will change that.

### FRUITFUL MEETINGS

The importance of relationships in business is also confirmed by, among other things, the example of Tomasz Cichowicz himself, who met with financial and strategic investors two years ago in the context of Printelize, an online platform mediating in 3D printing services. The meetings first resulted in selling the company in the USA, and then in the proposition to establish and run the Luma Ventures fund. "Today, we belong to one of the most active funds in Poland. In two years, we have invested over 40 million in Polish start-ups," says Tomasz Cichowicz.

Mentors who were participants in the competition several years ago know best the needs and expectations of fresh entrepreneurs. They know how much can be changed by the knowledge they share with their less experienced friends.

This is acknowledged by Szymon Kapturkiewicz, president of the management board of DriveCloud, which won the last year's edition of the competition and, this year, encouraged by the new shape, decided to participate in the next edition. "The form of the competition is now completely new, even more focused on ideas and businesses that are subject to a very rapid evolution. Nowadays, starting a new business by formulating a detailed business plan

is not as good as quick business modelling," says Szymon. "The primary direction is being prepared for changes that should stimulate the founders to make quick decisions," he adds. In this context, the new structure of the competition is the best answer to the needs of young entrepreneurs. "We were attracted to participate in the competition by the well prepared training courses on offer, possibilities of networking, integrating various environments, establishing contacts with potential partners and investors. However, the most important thing for us is the opportunity to work with a mentor very closely," he mentions.

### TAILOR MADE

DriveCloud, maker of smart solutions for transport companies, participated in the previous edition as the author of an idea that is currently being implemented. Support of the organizer and mentors is Szymon's capital for the future. He particularly emphasizes the careful choice of a mentor by a team and, in particular, their competences in relation to the needs of the company at its current stage of development. "Most participants will probably praise their mentors but we, in addition to praise, would also like to mention the great match between our mentors' experience and competences and the needs and stage we are currently at. Thanks to the organizers, we have the opportunity to work with Michał Wrzołek, CIO at the MCI Capital Group, leading investment funds in Poland and Europe. I have to say that the partnership is perfect. We receive professional knowledge and support at a level we couldn't even imagine," he sums it up. These words are the best justification for changing the structure of the competition "Youth in Lodz – I've Got a Start-Up Idea". •



**GRZEGORZ KIERNER, HEAD OF THE ECONOMIC COOPERATION, INNOVATION AND TECHNOLOGY TRANSFER CENTRE AT LODZ UNIVERSITY OF TECHNOLOGY**

Lodz University of Technology has been supporting the City of Lodz Office in organizing the "Youth in Lodz" competition since the very

beginning. That's why it is actively involved in shaping the programme's agenda. We are proud that

this year we act as a strategic partner responsible for mentoring.

We can see that over the years the approach to entrepreneurship has changed. When we were awarding ideas in the first edition of the "Youth in Lodz – I've Got a Start-Up Idea" competition (as it was then called), such terms as start-up and mentoring were unknown. We had to look abroad

to find investors interested in creative teams with a business idea. Today, in the 10th edition of the competition, we are extremely pleased that working with experienced mentors or speed dating with investors are a greater reward than winning prizes or money.

The group of nearly 40 mentors represents different competences, e.g. law, finances, modern technologies, innovation and constructing business models. Some of them represent the creative sector. The most valuable aspect of the competition is that each of the members is an active entrepreneur or professional.

The biggest challenge for the competition's coordinators was to match contenders with the

right mentors on the basis of needs analysis and competence profiles. We know we've succeeded and the results surprise even us.

It's a good idea that former participants are engaged in organising next editions. They already know the ropes of the market and pass on their experience to the contestants, talk about their mistakes and arrange meetings between mentees and their own clients, suppliers and advisors. This is useful in verifying market needs and properly planning your business. That's why winners of the previous editions of the competition are the best mentors. They are highly motivated to share their knowledge and skills obtained in the past years. ●

#### **GRZEGORZ LIŚKIEWICZ, RECTOR'S REPRESENTATIVE FOR ACADEMIC ENTREPRENEURSHIP AT LODZ UNIVERSITY OF TECHNOLOGY**

The evolution of the competition's format has been a good idea. I believe that mentoring is particularly important and so I am pleased that it is Lodz University of Technology that will be responsible for this particular element.

Many contestants decide to participate in the competition with a financial award in mind or hoping to meet an investor willing to give them gazillions after a short conversation. But it doesn't work like that. Of course, the financial aspect is very important, but you have to bear in mind that it's just one possible reason why start-ups fail. According to the CB Insights report, the most frequent reason is the lack of a market demand (42 percent), running out of money comes second (29 percent) followed by ill-chosen team (23 percent) and being outcompeted (19 percent). Then come pricing and cost issues (18 percent). Money is therefore only one of the elements in this puzzle. If we take a closer look, it'll transpire that, most often, the lack of interest from investors is not accidental. They are very experienced people who won't invest in a start-up without a profound analysis. That's why mentoring is so important. Collaborating with an experienced professional enables a business newbie to pass safely through the pitfalls and traps waiting for the inexperienced. A mentor is there for you to evolve your idea into a fully-fledged product attracting capital. The mentors we have on board are great specialists who devote their time as well as share their knowledge

and experience with the contestants.

Another good idea is that previous participants are engaged to help organize next editions.

Presently, acceleration programmes for start-ups flourish. Some start-ups that I know participate in more than one, but I don't think it's a good idea. The ten years of organizing the "Youth in Lodz – I've Got a Start-Up Idea" competition gives it a considerable advantage over other programmes. Hardly any accelerator boasts such long history, list of former participants and success stories. This is the value which cannot be replaced. Previous contestants are aware that the programme has propelled their career. Many of them pay off that debt by helping younger colleagues for no personal gain. Another important aspect of this collaboration is that current participants may become inspired by success stories hatched in the "Youth in Lodz – I've Got a Start-Up Idea" programme.

Lodz is a special city, established and developed by businessmen. Entrepreneurship is in its bloodstream. We shouldn't be therefore surprised that it is Lodz that developed its acceleration programme even before the terms such as: "start-up", "accelerator", "coworking" and "incubator" became known. It would be unforgivable not to use this capital. ●



BY BOŻENA WIELGO

# Inner balance and business

How to reconcile two distant—at first sight—areas of life: physical activity and business, if we don't plan to run a fitness centre? Does activity help create and successfully run a good company?



We can answer such questions if we look at the operation of Sunday is Monday ([www.sundayismonday.com](http://www.sundayismonday.com)), a company from Lodz founded five years ago by Emilia Kołowacik. She says that it is a “creative studio and a yoga-inspired brand.”

## WOMEN OF MANY TALENTS

Health problems – Hashimoto, an autoimmune thyroid disease – convinced her to change her previous lifestyle and take on new challenges. Her extensive business experience was helpful as well. For five years, Emilia Kołowacik was co-organizing the Lodz Design Festival as its director of development. She was also responsible for projects executed with business partners at

Fotofestiwal. She supported such brands as Ceramika Paradyż, IKEA, Meble Vox, Hewlett Packard, Swiss Krono Group, Kinnarps, Interprint Polska, Ton Polska, Chors, Tikkurila and Geberit. Her professional CV also includes such companies as the Pomeranian Science and Technology Park, Centre for Citizenship Education, Art\_Inkubator, EC1, Polska Witalna and Centrum Yogi. However, her “main value and dream is to move toward health and building inner strength.” Therefore, Sunday is Monday is a place where Emilia Kołowacik runs design-based operations with a team of active and creative co workers realizing their passions.

Women of many talents work at Sunday is Monday. Iza Kaczmarek-Szurek is a creator of posters



(e.g., for the fashion trade fair Grand Bazar) and illustrator (book and magazine cover designs). Kasia Szota-Eksner is a feminist and yoga instructor who teaches women to build inner as well as physical strength. Justyna Turek is a designer of visual experiences and creative processes. She has gained experience working at design studios, design centres and cultural centres in Paris, Helsinki, New York and Lodz. She is an enthusiast of sustainable development, design thinking, urban planning, visual arts and yoga.

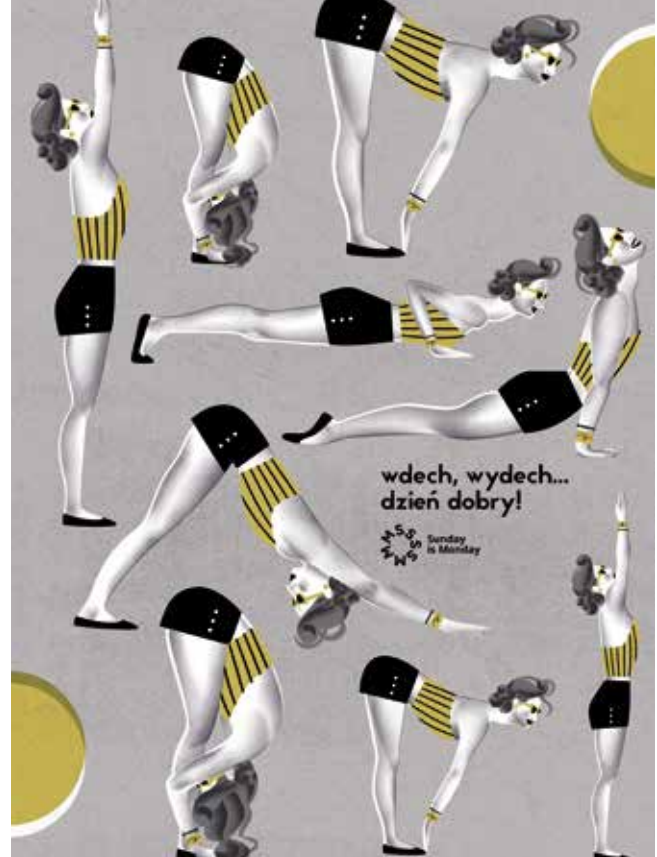
Anna Rudak is an illustrator and yoga enthusiast, while Aleksandra Woźniak and Hanna Niemrowicz from the Lodz graphic design studio Polkadot are the authors of the calendar published in 2017 by Sunday is Monday, as well as numerous infographics. Monika Burszczan is a photographer. Magda Paszkiewicz and Pola Chrobot design jewellery. Marta Redzynia is a dietician and enthusiast of a healthy lifestyle. She writes the blog *Zdrowe Podejście* (Healthy Approach). She co-created the poster “No to zdrowko!” (To Health, Then!) inspired by the food pyramid.

## WORKSHOPS IN A BETTER LIFE

The symbol and trademark of Sunday is Monday are posters made by Iza Kaczmarek-Szurek and Anna Rudak. “They are a funny encouragement to be active, eat well and express emotions,” says Emilia Kołowacik. “So far, we received the following distinctions: must have 2017, awarded by the Council of Experts and Lodz Design Festival, and the Animator nomination from the magazine *Design Alive*,” she adds. The illustrators’ works were presented both in Poland and abroad. This year, they were on display at the Hidden Power exhibition organized by Spirit of Poland during the San Francisco Design Week. In addition to posters, this creative company makes clothes, bags and even jewellery. All products are inspired by an active lifestyle and taking care of one’s health.

However, the foundation of Sunday is Monday’s business are workshops based on design thinking. One interesting proposition is the development workshop “Zadbaj o Siebie!” (Take Care of Yourself!). Using parts of design thinking, the participants work on achieving self-confidence and building inner strength. Design thinking consists of, among other things, understanding conscious and unconscious human needs and looking at a problem from many perspectives. Due to its universal nature, it can be used everywhere, there is no single obvious solution to a problem.

Another proposition – “Siła jest Kobietą!” (Strength is a Woman!) – combines the “Zadbaj o Siebie!” workshop with yoga practice. The founder of the



company organizes the workshops together with Katarzyna Szota-Eksner, yoga teacher and owner of the Yogasana school in Pyskowice.

Emilia Kołowacik also offers a workshop aimed at people diagnosed with Hashimoto: “Odpalam Hashimotor” (I Start My Hashi-Bike). During the meetings organized with Justyna Ossowska, Chinese medicine dietician and owner of the Natural Nutrition Studio “Kura Modowa” (Fashion Hen), she teaches patients how to take care of their thyroid. “Chronic lymphocytic thyroiditis is an autoimmune disease. In normal conditions, the immune system protects the body from infections. In this case, however, due to abnormal excitation, it produces antibodies against the body’s own thyroid. This causes chronic painless inflammation of the thyroid, slowly damaging this gland and leading to the reduced secretion of hormones,” explains Emilia Kołowacik. “We work on building healthy habits to feel decidedly better and halt the progress of the disease. We build a support group. We share knowledge,” she adds.

Those are just some of the activities conducted at Sunday is Monday. “Along with Kasia Szota-Eksner, we are currently in the process of writing a book about both normal and exceptional women who encourage others to take action through their charisma, passion, experiences,” says the company founder.

It’s like writing a bit about themselves – about their development, passion, desire to share with others and incredible creativity. About attracting people and infecting them with optimism and a will to take action. ●

# The only such place in Poland

BY BOŻENA WIELGO



The history of comics in Poland began in the early 20th century. The history of the place that will soon host Centrum Komiksu i Narracji Interaktywnej (the Centre for Comics and Interactive Narration) —the only such centre in Poland, unique on the European scale—began a dozen or so years earlier. Polish comics aficionados have been waiting for this exceptional place for over 30 years.

These seemingly unrelated pieces of information form a logical whole. The place we described is the decommissioned Łódź combined heat and power plant EC1 at Targowa street, which is being revitalized and expanded. The commencement of works there was facilitated by the decision of the City Council, establishing the institution called EC1 Łódź—the City of Culture. Its buildings have been refurbished and modernized to form a creative space, a place of cultural and artistic events.

The western part of the complex became home to the Science and Technology Centre with permanent exhibitions, the so-called educational paths covering power generation, the history of civilization and science, and “Micro World—Macro World.” The eastern part of the complex has been taken up by the Narodowe Centrum Kultury Filmowej (National Centre for Film Culture) with three cinema auditoria, an interactive exhibition of film technology and a centre providing comprehensive support to film-makers—the Łódź Film Commission. A planetarium has found its place there, too.

Currently, thanks to the support of the city authorities and EU funds, the last, south eastern part of the complex is being modernized and expanded. It covers old workshop structures that will house, after the conclusion of works, the Centre for Comics and

Interactive Narration, which is unique not just on the scale of Poland, but on the scale of Europe as well. The grant awarded by the Minister of Culture and National Heritage called “Regional Collections of Contemporary Art” will also facilitate the expansion of the first institutional collection of Polish comics art collected by the Department of Comics and Interactive Narration at EC1 Łódź.

## 30 YEARS AGO

The history of this idea begins in 1991, when the Contur Creators Association of Comics Illustrators first organized the International Festival of Comics and Games in Łódź.

According to Adam Radoń, the director and a good spirit of this initiative, “the history of the festival began at the Łódź Culture Centre.” It was home to the subsequent editions of this event. After five years, thanks to the city authorities, the festival moved to the Łódź Comics Centre established at ul. Piotrkowska 28. At the time, the initiative was sponsored by Dom Literatyczny (the House of Literature). Adam Radoń remembers this stage as a temporary one. “We wanted to familiarize people living in Łódź with the fact that comic books will have a presence in the city,” he says. “At the same time, when we were taking our first steps at Piotrkowska, first design works were already under

way at the City Hall. We were discussing the New Centre of Lodz and what will be there," he adds. And this is how the concept of the new Centre for Comics and Interactive Narration was born. Its implementation, however, would not be possible without the support of Hanna Zdanowska, the President of Lodz, who very much believed in the establishment of this unique cultural centre, as well as Błażej Moder, the director of EC1 Lodz – the City of Culture. The total cost of its last stage amounted to PLN 21 million, 16 million of which came from the European Union. The remaining amount was provided by the city.

### IN A NEW HOME

"A triple alliance was established, resulting in the construction works that have been carried out to the present day," says Adam Radoń and mentions that he began the first talks and negotiations with potential investors fifteen years ago. It is a good thing that the quest for a new centre coincided with the expansion and revitalization of EC1. The Centre for Comics and Interactive Narration completes the rich cultural offering of this place.

A space with interactive educational exhibits will be created on three floors of the last part of this historic structure. The ground floor and the first floor will become the world of games, where guests will be able to see how they are created, and a retro room presenting popular games. The second floor is the comics zone. Visitors viewing interactive educational exhibits will be able to learn the secrets of writing a script, creating characters, composing panels and pages. The attractions will include an opportunity to create a comic book on one's own. The building will also house reading rooms, meeting rooms, permanent and temporary exhibitions, as well as a café and a store. A virtual reality room will be a special attraction.

"Lodz has appreciated nearly 30 years of the festival's presence; our perseverance and determination in executing plans and intentions have given us the expected effect," says Adam Radoń and emphasizes the support he received from the city and EC1. "As the initiator, I have comprehensive substantive knowledge about what should be in such a centre," he says. "However, we need the support of experts on EU funds, experts on the execution of EU projects and, finally, experts on the entire investment process. All of this is provided by EC1," he adds.

The construction will conclude in 2019. "Its first stage, i.e. revitalization, construction and extension, is being performed by Erehta from Warsaw. Soon, we will

announce a tender for the Centre's equipment," explains Adam Radoń.

### WHEN DREAMS COME TRUE

The establishment of the Centre for Comics and Interactive Narration is the way dreams come true for the initiator and manager of this entire enterprise who has been watching the growing interest in such endeavours for many years. "The festival has brought up an entire generation of Polish makers of comics and games. People who now create games or cartoons as well as established comics authors began their adventure with this realm in Lodz. Practically everyone who is someone on this market participated in Lodz meetings with comics," says Adam Radoń. This is the origin story of, for example, Adam Badowski, head of CD Projekt RED, the creator of, among other things, the Witcher series of games. With the support of this studio, Adam Radoń has been organizing the event that has been accompanying the main festival for two years: the Promised Land Art Festival. He conducts many lectures, panel discussions, shows and workshops of digital and traditional art. This demonstrates the direction in which the Centre for Comics and Interactive Narration is going. "We will seek new ideas and new spaces. Narrative markets of modern media are growing. The festival, which lasted several days, will last an entire year, now," says Adam Radoń. "Nonetheless, getting to this stage is a very difficult process. And we need to demonstrate great perseverance and determination to take it to the conclusion," he sums the issue up.

Organizers and initiators of the Centre focus on education and finding young talents. They have the ambition to transform "initially small talents into great possibilities."

The Centre's offer will not be aimed solely at the youngest. The rich programme will also satisfy the older generation of fans of games and comics. "We want to demystify computer games. Today, they are like the photography of the 1990s. Back then, you had to know the entire alchemy of darkrooms, developers, fixers, enlargers. It was a type of knowledge accessible to a chosen few," says Adam Radoń. Nowadays, it's the same with games. "Everyone knows how they work, but they don't know how to make them. And one of our tasks will be to teach this knowledge and show young people that it's not outside their reach."

The completion of the project is rapidly approaching. There is hope that the 30th anniversary edition of the International Festival of Comics and Games will take place at the new seat of the Centre of Comics and Interactive Narration. ●

## **TATTOO FESTIVAL**

**3–4 NOVEMBER**

EXPO-LODZ, AL. POLITECHNIKI 4  
WWW.EXPO-LODZ.PL

## **FREEDOM GAMES 2018 – BATTLE OF HISTORY**

**9–11 NOVEMBER**

EC1 – THE CITY OF CULTURE, 6TH DISTRICT  
WWW.IGRZYSKAWOLNOSCI.PL

## **BOATSHOW – SAILING AND WATER SPORTS FAIR**

**9–11 NOVEMBER**

EXPO-LODZ, AL. POLITECHNIKI 4  
WWW.EXPO-LODZ.PL

## **NIGHT OF THE PROMS – CLASSIC MEETS**

**POP: LODZ**

**10 NOVEMBER**

ATLAS ARENA, AL. BANDURSKIEGO 7  
WWW.NOTP.COM/POLAND/

## **CONCERT OF MUSIC FROM FILMS OF ANDRZEJ WAJDA**

**16 NOVEMBER**

LODZ PHILHARMONIC, UL. NARUTOWICZA 20/22  
WWW.FILHARMONIA.LODZ.PL/PL

## **8th INTERESTING BOOK EXHIBITION AND 2nd FAIR OF CHRISTMAS GIFTS MIKOŁAJEK**

**16–18 NOVEMBER**

EXPO-LODZ, AL. POLITECHNIKI 4  
WWW.TARGI.LODZ.PL

## **STING & SHAGGY – CONCERT**

**17 NOVEMBER**

ATLAS ARENA, AL. BANDURSKIEGO 7  
WWW.ATLASARENA.PL

## **BATTLESHIP POTEMKIN AND CHRIS JARRETT LIVE**

MUSICAL THEATRE IN LODZ, UL. PÓŁNOCNA 47/51  
WWW.TEATR-MUZYCZNY.LODZ.PL/

## **GUEST PERFORMANCE “LUDZIE INTELIGENTNI”**

**17 NOVEMBER, 5:00 PM, 8:00 PM**

GRAND THEATRE, PL. DĄBROWSKIEGO 1  
WWW.OPERALODZ.COM

## **28th MEDIA FESTIVAL “MAN IN DANGER”**

**20–24 NOVEMBER**

FILM MUSEUM, PL. ZWYCIĘSTWA 1  
WWW.FESTIWALMEDIOW.ART.PL

## **BOKKA – CONCERT**

**22 NOVEMBER, 7:00 PM**

WYTWORNIA CLUB, UL. ŁĄKOWA 29  
WWW.WYTWORNIA.PL

## **23rd FORUM OF EUROPEAN CINEMA “CINERGIA”**

**23 NOVEMBER–1 DECEMBER**

WWW.CINERGIAFESTIVAL.PL

## **GUEST PERFORMANCE “GAELFORCE DANCE”**

**30 NOVEMBER, 7:00 PM**

GRAND THEATRE, PL. DĄBROWSKIEGO 1  
WWW.OPERALODZ.COM

## **AL DI MEOLA – CONCERT**

**3 DECEMBER, 7:00 PM**

WYTWORNIA CLUB, UL. ŁĄKOWA 29  
WWW.WYTWORNIA.PL

## **MOSCOW CITY BALLET “SWAN LAKE”**

**9 DECEMBER, 5:30 PM, 7:00 PM**

GRAND THEATRE, PL. DĄBROWSKIEGO 1  
WWW.OPERALODZ.COM

## **MOSCOW CITY BALLET “THE SLEEPING BEAUTY”**

**10 DECEMBER, 6:00 PM**

GRAND THEATRE, PL. DĄBROWSKIEGO 1  
WWW.OPERALODZ.COM

## **GLENN MILLER ORCHESTRA**

**14 DECEMBER, 7:00 PM**

GRAND THEATRE, PL. DĄBROWSKIEGO 1  
WWW.OPERALODZ.COM

## **CONCERT OF LEONARD COHEN’S SONGS**

**16 DECEMBER, 7:00 PM**

WYTWORNIA CLUB, UL. ŁĄKOWA 29  
WWW.WYTWORNIA.PL