



UNIVERSITY
OF WARSAW

research intensive university

SWOT Analysis
for “The Initiative of Excellence – Research Intensive University”
programme

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Introduction

This SWOT analysis of the University of Warsaw has been carried out for the purposes of “Excellence Initiative” project, as stipulated by the Ministry of Science and Higher Education. A reference point here has also been the external environment, particularly other universities and science centres, which the University of Warsaw is competing against when it comes to scientific research and education.

In the first step, **internal and external factors have been identified which most strongly influence the ability to achieve the aims stipulated by the Ministry, i.e.:**

- increasing the University’s impact on global science,
- strengthening cooperation with renowned scientific centres,
- improving the quality of teaching for undergraduate and PhD students (involving them in research, among other things) and competing for talented candidates (including from abroad),
- professional development of staff (including young employees),
- improving the quality of the University’s management.

In the second step, selected factors have been analysed in relation to the resources of the University of Warsaw and how it compares to other universities and research centres. As a result, a list of factors has been drawn up. A team made up of representatives from all the scientific fields at the University of Warsaw considers this list to be the comparative advantages and weaknesses of the University as well as relatively big opportunities and threats for the University.

In the third step, selected factors have been ascribed **importance and a ranking**. This has made it possible to reduce the list of factors to the five or six most important ones which – in the opinion of the team – have been ascribed the maximum value in the index (a product of the importance and ranking).

The most important factors have been analysed on the basis of various data and documents by a working group that liaises on a permanent basis with the University’s faculties. As a result, these **specific, evidence-based strengths and opportunities have been identified and described, ones on which the University of Warsaw may base its strategy** to achieve its goals; the same has been done for **the weaknesses and threats which need to be faced** so as to minimise risk and improve the University’s ability to operate efficiently. In the analysis, the SWOT – TOWS methodology has been adopted; it is used at other universities and has been described by Robert G. Dyson in his work *Strategic development and SWOT analysis at the University of Warwick* ([link](#)).

This SWOT analysis has made it possible to determine **the best strategy for the University of Warsaw**: leveraging its strengths and opportunities in order to remove or minimise weaknesses and threats. Such an approach will guarantee that the initiated mechanisms and processes are sustainable. On the basis of the SWOT analysis and upon assuming precisely this strategy, **priority research fields** have also been identified and **a package of pro-development actions** has been developed.

Chapter I. Strengths of the University of Warsaw as a research university

1. Communities, research programmes and projects with great potential for internationalisation and achieving significant scientific results

Many researchers and research teams from the University of Warsaw conduct world-class research as part of international programmes, consortia and partnerships. This naturally encourages shared publications, the development of young talented scientists, mobility and strengthening relations with important research faculties around the world. All this constitutes a good starting point leading to the realisation of the strategic goals of the Excellence Initiative.

A challenge for the University is to skilfully use these “isles of excellence” to develop the whole institution by means of consciously building synergies and strengthening the spill over effect. These are the most important assets of the University of Warsaw – either due to the recognition the University has gained around the world, due to the scientific quality of its partners, or due to the exceptionally broad possibilities for interdisciplinary cooperation.

International Research Agendas

→ units established jointly with renowned world research centres as part of a programme run by the Foundation for Polish Science

In a highly competitive, multistage contest-like procedure, the Foundation for Polish Science gives funding (on average around 35 million zloties per centre) for the creation of centres of excellence in collaboration with a prestigious foreign institution. The University's International Research Agenda is consequently a research centre with exceptional potential in that it combines scientifically-strong research teams from the University of Warsaw with outstanding scholars and excellent institutes from around the world. The University of Warsaw runs two Agendas on its own, and one more project submitted for the contest (in the field of the humanities) has been highly rated, though it did not receive financing. The high rating from the Foundation for Polish Science leads one to believe that this programme also has great scientific potential and the University of Warsaw should support its development.

- **ReMedy** (Regenerative Mechanisms for Health) ([link](#))

This project is headed by prof. Agnieszka Chacińska and is being carried out in partnership with the Medical University in Göttingen. The centre focuses on investigating regenerative mechanisms, particularly mechanisms of cell reactions to disorders caused by diseases (including genetic diseases), environmental factors and the process of ageing.

- **Centre for Quantum Optical Technologies** ([link](#))

The project is led by prof. Konrad Banaszek and is run in partnership with the University of Oxford. The faculty conducts research on the use of quantum phenomena, such as quantum superpositions and entanglement, in optical technologies, which are used e.g. in communications.

- **Research into sign language**

This project was submitted for the contest by Paweł Rutkowski (PhD), head of the Section for Sign Linguistics ([link](#)). Highly rated, the project was close to receiving funding. Dr Rutkowski, on his collaborators, built the Polish Corpus of Sign Language from scratch, and it is now one of the two biggest corpora of its kind in the world. It enables one to conduct scientific research (also of a comparative nature) on the rules of sign language, which with appropriate support (the Section for Sign Language is now part of the Faculty for Polish Studies) suggests the faculty will become part of world science.

International research consortia

→ the result of cooperation between renowned research faculties which conduct research, exchange experience, and create research infrastructure and new methodologies

- **CERN**

The experimental group at the Physics Faculty has made a significant contribution to establishing and modernising the Compact Muon Solenoid (CMS) at the Large Hadron Collider. Currently it actively participates in the analysis of the data that is being collected. The research agenda of the CMS experiment covers first and foremost research on the mechanism of spontaneous symmetry breaking, the search for physics signals beyond the Standard Model, and research on heavy ion collisions in a new field of energy (quark-gluon plasma and other features of nuclear matter at high energies).

When it comes to neutrino physics, employees and PhD students from the University of Warsaw take part in leading international experiments, above all in T2K ([link](#)). The main goal of the research, which will continue in the years 2020–2026, is to precisely measure the parameters of neutrino mixing and determine the neutrino mass spectrum.

Moreover, research will continue as part of the experiments NA61/SHINE (searching for quark-gluon plasma signatures) as will research on the nucleon spin (parton) structure in the SPS accelerator at CERN.

- **DARIAH-ERIC** (Digital Research Infrastructure for the Arts and Humanities – European Research Infrastructure Consortium, [link](#))

The University of Warsaw has initiated and remains a leader of a consortium of Polish scientific institutions investigating the development of digital humanities in Poland – DARIAH-PL – the biggest consortium for humanities in Poland. This has helped to introduce Poland to the European DARIAH-ERIC network, whose strategic aim is to facilitate access to jointly developed digital tools and research data regarding art and the humanities.

Thanks to this initiative, the University of Warsaw has also created an internal network of researchers (The Digital Humanities Lab at the University of Warsaw) and has helped to take advantage of our strong competencies in IT, mathematics and mathematical modelling with the aim of supporting research within the humanities.

Knowledge and innovation communities at the European Institute of Innovation and Technology (EIT)

→ teams oriented towards delivering new solutions regarding key social and industrial challenges

The concept behind the EIT envisages the commencement of international and cross-sectoral cooperation (research and educational centres, large corporations and industrial start-ups, NGOs) to deliver ready-to-implement solutions to the market. The University of Warsaw belongs to two such teams and has been invited to join another.

- **EIT Food** ([link](#))

This consortium is formed of 50 partners from 13 countries – companies, universities and research institutes, and covers the whole chain that makes up the food sector. The aim is innovative, economically sustainable initiatives regarding *food for the future*, which make it possible to improve the state of health of society, gain access to good food and improve the natural environment. Due to the role which scientists from the University of Warsaw played when setting up the consortium, one of the so-called co-location centres (CLC) for Europe (CLC North-East – for Central and Eastern Europe and Scandinavian countries) is headquartered in Warsaw. Since it was established two years ago, EIT Food UW has been either a partner or a leader in over 20 research or educational projects, or projects connected with entrepreneurship.

- **EIT Climate** ([link](#))

This consortium is formed of 370 partners – universities, research institutes, companies, local councils, etc. Its goal is research and the search for innovation in order to protect the environment and create a low-emissions economy. The University of Warsaw has only just started to participate in the consortium, but undoubtedly it has

great potential as regards exact, natural and social sciences. For many years, at the University, the University Centre for Environmental Studies and Sustainable Development has been active (it is part of the European Copernicus network, [link](#)) and it conducts educational courses (e.g. starting from the academic year 2019/2020 a degree in Sustainable Development taught in English). The University of Warsaw has also strong research teams which conduct research on the atmosphere, have excellent competencies, and tools developed at the Interdisciplinary Centre for Mathematical and Computational Modelling (ICM, [link](#)). Among those particularly noteworthy are its well-known and highly-regarded meteorological forecasts based on a sophisticated mathematical model ([link](#)).

- **EIT Health** ([link](#))

The University of Warsaw has been invited to join this consortium, and this decision means being federalised with the Medical University of Warsaw. Therefore signing the contract has temporarily been put on hold.

Flagship projects as part of the European Commission programme called “Future and Emerging Technologies” (FET)

The University of Warsaw is a member of three consortia which have reached the second stage and have received the status *preflagships*:

- **Time Machine** ([link](#))

This consortium is formed of 60 research institutes led by the Swiss Federal Institute of Technology (ETH) in Zurich and archives from 19 European countries.

- **Humane AI** ([link](#))

This consortium is formed of 35 partners from 17 countries, including four big industrial partners. The aim of the project is to design and implement artificial intelligence systems, which are supposed to increase human capabilities at the individual and social level, and extend (but not replace) human intelligence.

- **Sunrise** ([link](#))

The project is managed by the Leiden University in the Netherlands. Sunrise offers a sustainable alternative to energy-intensive production of fuels and basic chemicals based on fossil fuels. The necessary energy will be provided by sunlight, raw materials, such as carbon dioxide, water and nitrogen, will be abundantly available in the atmosphere.

Prestigious, large and long-term research grants

→ grants obtained in the most challenging international competitions, which include strong elements of internationalisation and development of young teams and put an emphasis on sustainability

- **European Research Council (ERC) grants**

Researchers from over 30 countries (including from non-European countries) compete for these. Researchers from the University of Warsaw have received almost half of all ERC grants granted to Polish researchers (14 out of a total of 32 grants), including mathematicians from the University of Warsaw (an impressive 8 grants), physicists and astronomers (2 grants), humanists (including archaeology, 3 grants), and one grant was awarded to social sciences. This again proves the strength of natural and exact sciences at the University of Warsaw, but it also shows the hidden potential of the humanities and social sciences.

- **The German Electron Synchrotron (DESY) and Global System International (GSI) in Germany, the Universities of Oxford and Cambridge, the laboratories of the French National Centre for Scientific Research (CNRS), Fermilab in the USA, Japan Proton Accelerator Research Complex (J-PARC) and the neutrino laboratory at the Kamioka Observatory in Japan.**

The Physics Faculty cooperates with these prestigious research centres on a permanent basis. Thanks to this, both undergraduates and PhD students at the University of Warsaw have the chance to take part in the most important physics experiments conducted in the world and extend their scientific contacts.

Institutional grants

→ grants that make it possible to establish innovative research-teaching and research faculties

- **grant from the foundation “Institute Artes Liberales”**

This made it possible to transform the “Artes Liberales” Institute for Interdisciplinary Studies into the most experimental and interdisciplinary faculty of the University of Warsaw. The Faculty offers unique degrees in extensive cooperation with research centres and cultural and artistic institutions. The activities of the Faculty are organised not only by the Faculty Council, but also by the programme council of the Foundation, which partly consists of people from outside the University, thus connecting the Faculty with the external environment.

- **Google grant**

Funds to the tune of one million dollars have been used to found a research institute which conducts research on the social and industrial consequences of the development of modern technologies. The University of Warsaw has joined a small group of three universities (Stanford University, the University of Oxford, Humboldt University of Berlin) at which the company has funded three similar research institutes. Thanks to the grant, the Digital Economy Lab (DELab UW) was established by the Faculty for Mathematics, Information Technology, and Mechanics, the Faculty of Economic Sciences, and the Interdisciplinary Centre of Mathematical and Computational Modelling.

An asset of the project was not only the fact that it established and developed an interdisciplinary research team, but also there were project requirements connected with planning a road map and success indicators. Within three years it was possible to obtain three times the sum of the grant (3 million dollars), thanks to which the team was able to acquire extensive competencies regarding project management, communication with the community, building relations with public institutions and industry.

**Interdisciplinary faculties and scientific environments
centred around important scientific and/or methodological issues**

In the case of initiatives like this one, the University's stiff structure and "clumping" posed a problem, making it difficult to consolidate scientific and research resources around shared topics in a flexible way. At the same time, worldwide science is developing more and more through research at the interface between disciplines. Thus we are coming face to face with the combining of competencies and approaches as well as the merging of research fields that were previously very separate.

- **Interdisciplinary Centre for Mathematical and Computational Modelling** ([link](#))

This faculty makes use of the tools from mathematics and IT, and also those of high-performance computing facilities (including for data science projects).

- **Centre of Migration Research (CMR)** ([link](#))

This faculty conducts interdisciplinary research on migration processes, particularly in Poland and Europe. 57 researchers are currently affiliated to the Centre of Migration Research. They include: sociologists, economists, demographers, political scientists, lawyers, and also social anthropologists and psychologists.

- **EUROREG Centre for European Regional and Local Studies** ([link](#))

This faculty both educates students and conducts interdisciplinary research on the dimensions and consequences of globalisation in its various aspects. Economists, sociologists, geographers, political scientists, specialists in the field of organisation and management from numerous research centres, cities, and public institutions work with the Centre.

- **Digital Economy Lab (DELab)** ([link](#))

This faculty, founded thanks to an institutional grant from Google, is made up of team of economists, sociologists, lawyers, and specialists in the field of management who investigate the social, economic, and cultural consequences of digitalisation and the development of modern technologies.

- **Digital Humanities Laboratory LaCH** ([link](#))

This faculty was established with the idea of creating a Polish DARIAH consortium and enabling Poland to join DARIAH-ERIC. It unites researchers from various disciplines of the humanities and social sciences (e.g. media studies) with IT specialists and statisticians. It provides support connected with digitally equipping humanities projects, provides training sessions, and access to digital tools. It works extensively with cultural institutions.

- **Centre for Bioethics and Biolaw** (established in cooperation with Warsaw Medical University) ([link](#))

The faculty unites experienced and young researchers concerned with the ethical, legal and socio-cultural aspects of the development of medical and biological sciences.

- **General university statistics centre**

The faculty is still in the pipeline and will aim to use the potential of statistics, currently scattered around various faculties.

Twinned faculties

→ scientific or teaching faculties created in partnership with well-known, influential scientific centres

- **The Robert Zajonc Institute for Social Studies (ISS)** ([link](#))

Established in 1991, this is the interdisciplinary twin faculty of the Institute for Social Research (University of Michigan, Ann Arbor) and the Polish representative at the Inter-university Consortium for Political and Social Research (ICPSR). The long-term collaboration of the two faculties also has a strong component involving teaching

young staff (summer schools in Ann Arbor, scholarships for PhD students). The potential of this partnership might be used to a larger extent, even though the projects conducted by ISS are of world-class quality.

- **School of Education** ([link](#))

This faculty was created by the Polish-American Freedom Foundation and the University of Warsaw in collaboration with Teachers College at Columbia University. Its aim is the implementation of innovative teaching methods.

All the above-named initiatives and research programmes share several features:

- inter- and cross-disciplinarity, which are currently gaining more importance in scientific databases at a very fast pace,
- well-functioning, partner-like relations with renowned scientific faculties around the world,
- they are embedded in key, ground-breaking disciplines in the context of scientific and social challenges,
- an emphasis is placed on the mobility of people and ideas, including the support for the mobility of young scientists,
- the inclusion of young scientists and students in international research and consequently, improving the standards of staff education and creating open career paths for talented people (particularly PhD students),
- functioning in environments with high project and organisational requirements and consequently, building a new, more efficient and more transparent organisational culture.

There is no doubt that all the forms of scientific activity mentioned can provide strong foundations and a strong impulse to increase the influence of the University of Warsaw on global science.

2. Modern research infrastructure and unique scientific resources

2.1. Modern research infrastructure

The University of Warsaw has successfully used the potential which appeared when Poland joined the European Union in 2004. From the structural funds alone, the University has so far received around 1.3 billion zloties (over 300 million Euros) for the purpose of infrastructure projects. Detailed information on the infrastructure financed from EU funds can be found in the table “Scientific-research and teaching facilities at the University of Warsaw financed from EU funds”.

Here is a selection of the largest investments in scientific-research facilities which have beyond doubt improved the potential and the attractiveness of the University:

- **New Technology Centre at the University of Warsaw** ([link](#))

This investment included building and providing equipment for a complex of two buildings, at the Ochota Campus, meant for scientific and teaching activities in molecular biology, biotechnology, IT applications, physics, chemistry and material technology (for a list of laboratories, see the [link](#));

- **The University of Warsaw Biological and Chemical Research Centre (CNBCh UW)** ([link](#))

Ultra-modern facilities and research centre have made it possible to establish a leading European scientific centre, which conducts research into biological and chemical sciences and transposes their results to agriculture (for a list of laboratories see the [link](#)).

- **Ochota Campus**

Here are located large laboratories belonging to various faculties (physics, chemistry, biology, geology, mathematics and IT) and other University faculties (the Heavy Ion Laboratory, Interdisciplinary Centre for Mathematical and Computational Modelling). One will also find the faculties of Warsaw Medical University and the faculties of the Polish Academy of Sciences (the M. Nencki Institute of Experimental Biology, Institute of Biochemistry and Biophysics, the M. Mossakowski Medical Research Centre, Institute of Biocybernetics and Biomedical Engineering). The synergy of these resources has created the largest, best-equipped campus of mathematical-natural and medical sciences in Poland, which stands out due to its high potential for research development and internationalisation.

All the investments which develop the infrastructural base of the University increase its scientific-research potential and improve the quality of teaching. Due to the modern facilities, the University is one of the largest and fastest growing teaching centres nationwide.

2.2. Research resources of a unique character

- **ICM Technology Centre** ([link](#))

This is the most modern data science centre in Central Europe, equipped with facilities for performing advanced large-scale calculations, but also for data processing, analysis and visualisation.

- **research stations in Poland and abroad**

- **Cairo**

Since 1959, a University field station has been in operation there. It conducts research into Egypt's past and also serves as a logistics station for archaeologists who work in Syria and Sudan.

- **Chile**

The Astronomical observatory Las Campanas, located in the Atacama Desert (one of the best locations for observing the sky), is equipped with one of the largest Polish telescopes.

- **Białowieża**

The Geobotanical station on the outskirts of Białowieża, the last well-preserved fragment of primeval forest on the European Plain, is equipped with modern facilities like an instrument for measuring photosynthetically active radiation (PAR) and determining Leaf Area Index (LAI), an experimental greenhouse, a spectrophotometre, and a phytotron chamber.

On the premises and grounds of the station, one can conduct research e.g. on plant mapping, the dynamics and anthropogenic transformations of vegetation, the functional meaning of biological diversity (project FunDivEurope, [link](#)), or the impact of climate change on the natural distribution of species and the species composition of ecological systems (project KlimaVeg, [link](#)).

- **Chęciny**

The European Centre for Geological Education ([link](#)) is a modern scientific-research centre located in the Świętokrzyskie Mountain region (a region of particular value when it comes to developing geological education, paleontology and archaeology). The laboratories there (hydrogeological, geochemical, microscopic, computer and geological mapping laboratory, geophysical laboratory and a laboratory for preparing geological samples) constitute a scientific and educational facility of the highest order.

- **Urwitalt**

The Masurian Centre for Biodiversity and Nature Education ([link](#)) is located in a unique natural region. The University of Warsaw has submitted a plan to modernise the Centre, one which provides for the restoration of protected habitats, the improvement of the habitat of protected species, the improvement of water regimes, the erection of a building to house an interactive biodiversity centre and a building for nature workshops. When the project is completed, it will be a place for education and research, and particularly attractive for both students and scientific staff.

- **research facilities of general-university and nationwide importance**

- **Heavy Ion Laboratory** ([link](#))

This is the only centre for experimental nuclear physics nationwide which has at its disposal a heavy-ion cyclotron and modern spectrometres for doing research on the structure of an atomic nucleus and nuclear reactions.

- **Laboratory of Media Studies** ([link](#))

The centre has at its disposal state-of-the-art research equipment and software for biometric research (including an iMotions Research Platform, SMI Experiment Suite Scientific Premium, Tobii Studio, Web crawling). Its interdisciplinary research team of specialists ensures a comprehensive expert research service.

- **Information science structure created in the Okeanos system**

As part of the project, infrastructure was created including a building with a new server room with technical facilities and a tool lab, an integrated infrastructure of systems for storing, analysing and processing massive datasets. Also hardware ([link](#)) and software ([link](#)) have been bought.

3. Scientific disciplines with great potential for development and substantial impact on world science

3.1. Scientific disciplines and teaching programmes of a unique character nation- and Europe-wide

At the University of Warsaw, there are numerous research trends and specialisations within almost all the scientific disciplines. Here are the most interesting examples from three areas of science. It would seem that they help to improve the attractiveness of teaching at the University of Warsaw and to strengthen our cooperation with prestigious research centres and thus to increase the University's contribution to world science. With the right support, they may become a magnet for talented undergraduates, PhD students, and researchers both from Poland and abroad.

Humanities

- fields of study and specialisations at the **Faculty of Oriental Studies**: African Studies (languages: Swahili, Hausa, Amharic and others), Egyptology, the cultures of the Ancient Near East (languages: Akkadian, Sumerian, Hittite and others), Mongolian and Tibetan Studies, Arabian Studies, Tamil Studies, Bengal Studies etc.,
- Research on **pre-Columbian cultures** of South America and Mesoamerica conducted using state-of-the-art techniques (geoarcheology, archeometry, GIS, HDS, LiDAR and others),

- **archeological sites** in unique locations (Peru, Bolivia, Chile (Easter Island), Salvador, Mexico, Guatemala),
- **archeomusicology** – an interdisciplinary specialisation that investigates archeological artefacts related to musical activities,
- **the Urus database** (link) – created as part of art historiography (around 6500 photographic prints from around 3000 matrixes, around 600 paintings, sculptures and drawings),
- **Corpus-based Dictionary of the Polish Sign Language** (link), the second largest such corpus in Europe.

Social sciences

- **Neurocognitive studies** – developed at the BabyLab Infant Psychology Laboratory (link) by an interdisciplinary team of psycholinguists, cognitive psychologists and neuropsychologists,
- extension of the possibilities of **environmental research in hard-to-reach areas**, using unmanned aircraft – the result of cooperation between geographers from the University of Warsaw and specialists in teledetection from The University of Warsaw of Technology,
- **a project for integrating administrative registers** – the result of cooperation between statisticians, sociologists and economists from the University of Warsaw and Warsaw School of Economics.

Thanks to this project, a system for monitoring the careers of university graduates was set up (link). The team (together with public institutions) is currently beginning the process of integrating further registers (among others, those of the Social Insurance Institution and the National Health Fund), which will make it possible to assess the actual costs of diseases and the costs of modern therapies in comparison with the costs of falling out of the labour market.

- projects conducted at the **Laboratory of Media Studies** (link), which make it possible to investigate e.g. the creative industries.

Exact and natural sciences

- pioneering research based on molecular mechanisms connected with **chromatin structure remodelling** and the regulation of gene expression in plant and animal cells,
- interdisciplinary research on the mechanisms of regulating RNA metabolism in eukaryotic cells, using the developments in genetics, molecular biology, proteomics, and structural biology,
- **observational astronomy** (including large-scale photometric sky surveys) – the Astronomical Observatory of the University of Warsaw is a world leader in this field,
- **subatomic** research (e.g. building and modernising the CMS detector at the Large Hadron Collider at CERN involving a group of scientists from the University of Warsaw),
- interdisciplinary research on **biological systems at the molecular level**, combining basic research with applicative research; the invention, which consists in prolonging the life expectancy of a chemically modified mRNA under *in vivo* conditions while simultaneously increasing the efficacy of the translation, has been applied in developing anti-cancer vaccines based on RNA,
- research on brain-computer interfaces (BCI) at the Faculty of Physics of the University of Warsaw,
- research at the **Radiation Transfer Laboratory** ([link](#)) (e.g. clouds and aerosols, atmospheric turbulence, the structure of the interior of the Earth, dynamic processes inside the Earth, fluid mechanics); equipped with multi-channel lidar and cloud radar, the Laboratory will make it possible to conduct unique **experimental research and make the RTL a significant link in the European measurement network**,
- research on the **structure of the atomic nucleus and nuclear reactions**, conducted at the Heavy Ion Laboratory, which has been included in the network of prestigious European research centres (consortium ENSAR2) and belongs to the 12 best research facilities of the consortium with equipment unique in Poland (a cyclotron U-200P),
- **an original theory of countability in nominal sets**, developed by mathematicians and logicians, enables one to analyse calculations conducted on any (also amorphous) data in a precise way; in the course of the work, two programming languages were designed which make it possible to operate effectively on infinite sets,
- **research on a cryptographic group** which has suggested an **innovative method** of using an open system of an electronic currency (bitcoin) for safe multi-entity calculations.

3.2. Teaching programmes awarded international certificates

The University of Warsaw has faculties and teaching programmes which receive distinctions in the form of foreign accreditation of its teaching quality. According to data used by experts from the “Perspektywy” Foundation’s University Ranking to rank Polish universities, in 2019 the University of Warsaw has received **six distinctions confirmed with international certificates and accreditations**. These certificates are on the qualified list of the Ministry of Science and Higher Education, which confirms the high teaching standards of the University.

These certificates of quality have been given to subjects in the humanities, social and exact sciences. In detail, they are:

- **Faculty of Applied Linguistics** – a European Masters in Conference Interpreting Certificate,
 - **Faculty of Management** – EQUIS (European Quality Improvement System) accreditation since 2017. One of the three most important accreditations for universities and business faculties in the world (link),
 - **Faculty of Economic Sciences** – accreditation for the field of study “Finance, investments and accounting” from the international Association of Chartered Certified Accountants (ACCA) since 2018 (link);
 - **Faculty of Economic Sciences** – 1st place in the ranking of economic faculties in the “Rzeczpospolita” newspaper in 2018 (link),
 - **Faculty of Management** – 6th place in the ranking of economic faculties in the “Rzeczpospolita” newspaper in 2018 (link),
 - **Faculty of Chemistry** – Euromaster Certification (ECTN)
- Furthermore, the University belongs to the **EUA-Institutional Evaluation Programme of the European University Association (EUA)**.

3.3. Disciplines that rank highly

According to the Academic Ranking of World Universities (Shanghai ranking, AWRU), **the University of Warsaw is the highest placed Polish university**. In 2018 it was in the group of universities classified between 301-400 ([link](#)).

Table 1. Polish universities according to ARWU 2018

	901–1000	801–900	701–800	601–700	501–600	401–500	301–400
University of Warsaw							
Jagiellonian University							
AGH University of Science and Technology							
Adam Mickiewicz University							
Medical University of Warsaw							
Warsaw University of Technology							
Medical University of Silesia							
Technical University of Lodz							
Nicolaus Copernicus University							
University of Lodz							
University of Wroclaw							
Wroclaw University of Technology							

Source: ARWU 2018.

The Shanghai ranking also includes a domain-specific collation of universities (ShanghaiRanking Consultancy). In the 2018 report, 10 scientific disciplines taught at the University of Warsaw were included ([link](#)). The highest places (51–75) were taken by **mathematics and physics**. The remaining eight scientific disciplines at the University of Warsaw included:

- **political science** – places 201–300,
- **ecology** – places 301–400,
- **psychology** – places 301–400,
- **economics** – places 301–400,
- **computer engineering** – places 301–400,
- **chemistry** – places 401–500,
- **Earth sciences** – places 401–500,
- **material engineering** – places 401–500.

In the QS World University Rankings from 2019, the University of Warsaw occupies 394th place (up 45 places in relation to 2018) and thus it is among the top 4% of universities in the world. Other Polish universities were above the 400 position ([link](#)).

In the QS World University Ranking by Subject, 17 fields of study at the University of Warsaw were classified (link):

- **archaeology, modern languages and philosophy** – places 101–150,
- **philology, English, geography, history, linguistics, physics and astronomy, media communications and studies** – places 151–200,
- **sociology, mathematics, law, IT** – places 201–250,
- **biological sciences, economics and econometrics** – places 351–400,
- **chemistry** – places 351–400,
- **management** – places 451–500.

The ranking from US News and World Report 2019 places the University of Warsaw 132nd in Europe and 294th in the world (link).

In the THE University Impact Rankings 2019, prepared by Times Higher Education, the University of Warsaw ranks between 201–300. This ranking is a new initiative of the Times Higher Education magazine, which shows the impact of universities on society and the economy (link). In the second set by THE – New Europe Ranking 2018, the University of Warsaw took sixth place. The ranking took into account countries that became members of the EU in 2004 and later (link).

In 2019, the University of Warsaw turned out to be the best Polish university according to the Ranking of Universities by the “Perspektywy” Foundation. **In the 20th edition, the University of Warsaw received 100 points** (link) and **took first place**. The University of Warsaw was recognised not only as the best university in the country, but also as the university with the greatest educational effectiveness. The University also topped the rankings for 16 study programmes. The following were considered the best in the country:

- **archaeology,**
- **astronomy,**
- **journalism and communications,**
- **philosophy,**
- **physics,**
- **geography,**
- **geology,**
- **history,**
- **information technology,**
- **cultural studies,**
- **mathematics,**
- **political science,**
- **sociology,**
- **international relations,**
- **economics and management** (equal with the Warsaw School of Economics).

4. Human Resources

4.1. World-renowned scientists

The University of Warsaw is the workplace of **127 outstanding scientists**. The majority, **88 people**, are scientists with outstanding achievements, while the rest make up a group of young scientists. These academics represent 25 faculties at the University of Warsaw, in particular the Faculty of Mathematics, Computer Science and Mechanics, the Faculty of Physics and the Faculty of Law and Administration.

Among the researchers with outstanding achievements are grant recipients and the leaders of prestigious projects, such as:

- **Horizon 2020 / the 7th framework programme of the European Community for research, technological development and demonstration,**
- **European Cooperation in Science and Technology (COST),**
- **DARIAH-ERIC,**
- **the EIT Climate and EIT Food knowledge and innovation communities,**
- **the SESAR programme (Single European Sky ATM Research),**
- **IDEAS Plus, a programme of the Minister of Science and Higher Education.**

Scientists with outstanding achievements from the University of Warsaw regularly use various forms of funding offered by the Foundation for Polish Science, such as:

- **awards,**
- **scientific trips abroad,**
- **Nicolaus Copernicus Polish-German Scientific Award,**
- **FIRST TEAM programme,**
- **TEAM programme,**
- **TEAM-TECH programme,**
- **TEAM-TECH Core Facility and TEAM-TECH Core Facility Plus programmes,**
- **IMPULS programme,**
- **HOMING programme,**
- **POWROTY programme.**

Among the outstanding young scientists there are many people working in networks, consortia and international projects, and this youngest generation includes 12 Diamond Grant laureates ([link](#)). Our young scientists have won numerous Olympiads and international competitions, such as:

- the Academic World Championship in team programming (ICPC),
- the Annual Wojtech Jarnik International Mathematical Competition,
- the ASC17 Student Supercomputer Challenge,
- the Baltic Olympiad in Informatics,

- the Best Paper Award during Faith and Power: Undergraduate Conference in History
- the Central European Regional Contest (IT),
- the European Mathematical Olympiad for Girls,
- the Hugo Sinzheimer Moot Court Competition (international labour law),
- the International Linguistics Olympiad,
- the International Mathematics Competition for University Students,
- the International Olympiad on Astronomy and Astrophysics,
- the International Physicists' Tournament,
- the International Russian Language Olympiad "Gramotey",
- Midnight Sun CTF (computer security),
- the North Countries Universities Mathematical Competition,
- the ROTMAN European Trading Competition (capital markets),
- the University Physics Competition,
- the William Lowell Putnam Competition,
- the Baltic States' Mathematics Competition

and a raft of international Olympiads.

4.2. Outstanding young scientists

The University of Warsaw is creating an environment for the dynamic scientific development of **75 outstanding young scientists** participating in prestigious projects, networks and consortia. These are people who in the years 2016–2019 received such prestigious grants as:

- **START (FNP)**

The grant holder may be a person who is a PhD student or a PhD, but at the time of submitting the application they must be under the age of 30.

- **FIRST TEAM (FNP)**

The holder of such a grant may be a person who, at the time of applying, has had their PhD degree for no longer than five years (in justified cases this period may be extended to nine years).

- **STARTING GRANT (ERC)**

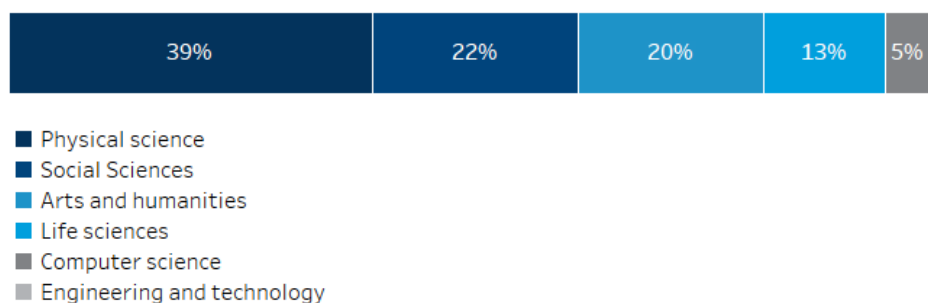
The grant holder may be a person who at the time of applying has had their doctorate or higher degree for no longer than two to seven years.

- **POWROTY (FNP)**

These grants support the implementation of post-doctoral internship projects carried out by young doctors returning to academic work after a break related to parenthood or work outside the field of study. The holder of such a grant may be a person who, at the time of applying, has had their PhD for no longer than five years (in justified cases this period may be extended to nine years).

These prestigious grants for young scientists have been awarded in such areas as physical sciences, social sciences, arts and humanities, and life sciences.

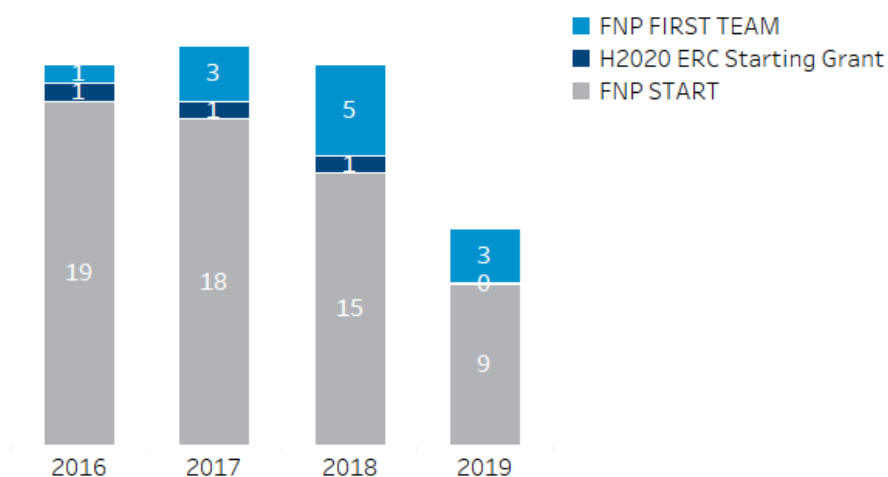
Picture 1. Grants of young scientists at the University of Warsaw by Fields, 2016–2019



Source: UW data.

In recent years, University researchers have received an average of 21 prestigious grants per year (data for 2019 in line correct as of May 31, 2019). The holders of FNP START projects are the largest category of young outstanding scientists from the University of Warsaw.

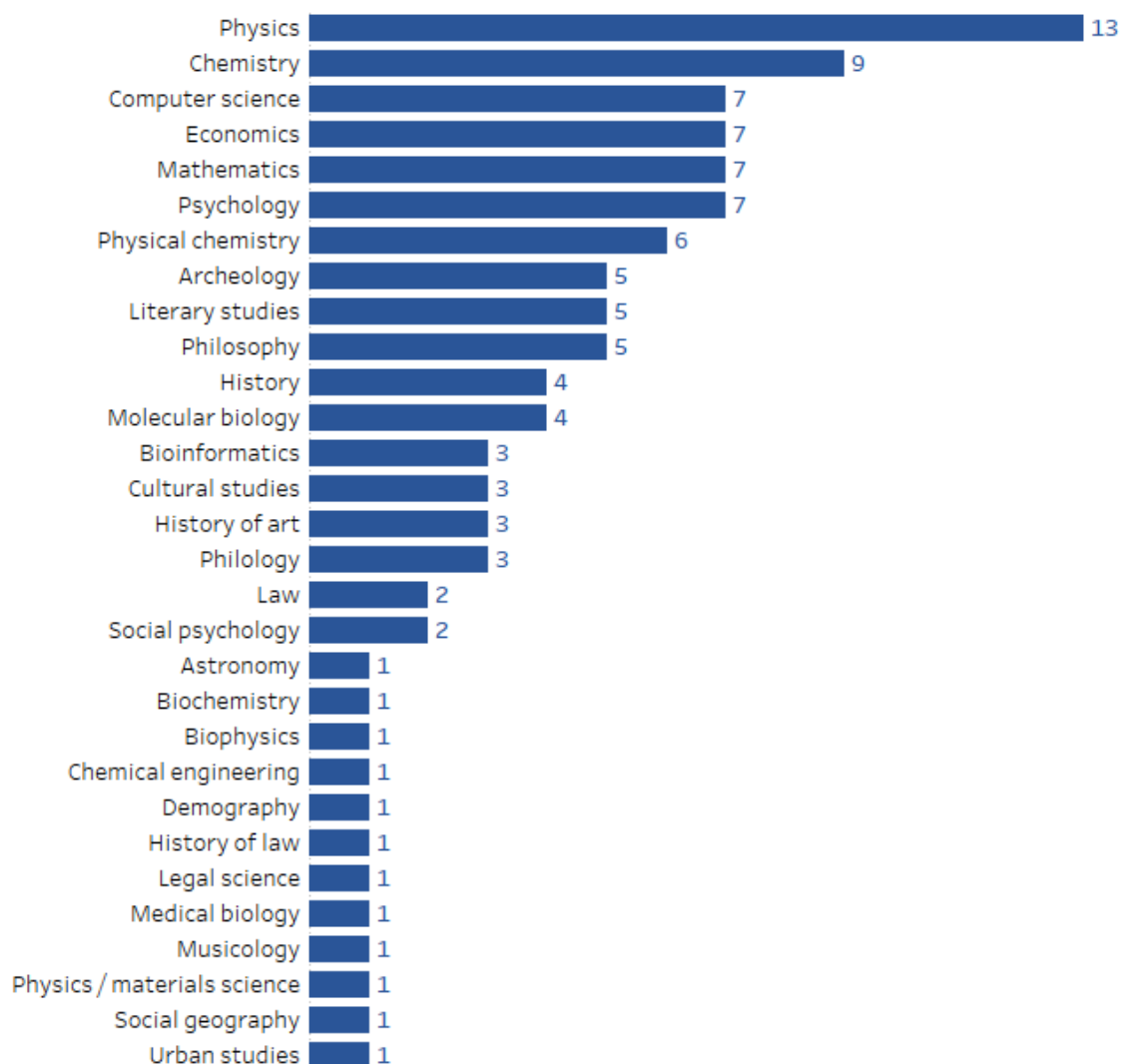
Picture 2. Dynamics of the number of prestigious projects carried out by young scientists (PhD) at the University of Warsaw by types of financing programmes, 2016–2018



Source: UW data.

In 2016–2019, the University received 61 grants, including in the following disciplines: physics, chemistry, mathematics, IT, economics and psychology.

Picture 3. FNP START grants received by young scientists at the University of Warsaw by disciplines, 2016–2019



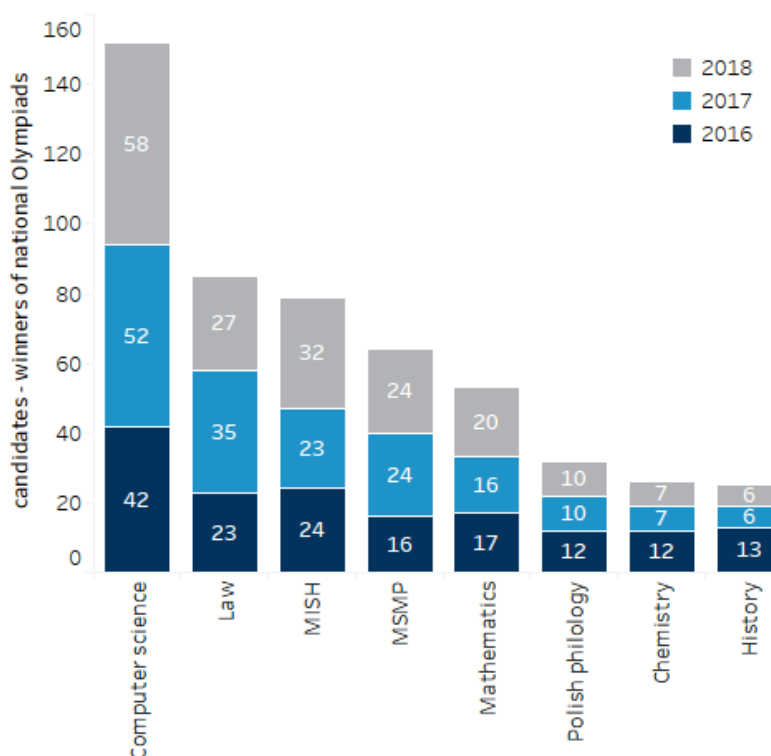
Source: FNP data.

4.3. Talented candidates for undergraduate studies

Candidates for undergraduate studies in Poland have a choice of over 400 institutions from all over the country. The University of Warsaw attracts the most talented young people. Every year, the University of Warsaw receives applications from **over 300 winners or finalists of national Olympiads and other competitions** that allow them to obtain the maximum number of points in the qualification procedure.

The winners of national Olympiads and other competitions mainly choose the following fields of study: computer science, inter-faculty individual studies in the humanities and social sciences (MISH), law, inter-faculty environmental studies (MSMP), mathematics, Polish philology, chemistry, and history.

Picture 4. Number of candidates with the title of winners or finalists of national Olympiads and other competitions in recruitment at the University of Warsaw by fields of study, 2016–2018



Source: UW data

The large number of candidates with the best achievements who apply to the University of Warsaw translates into a stronger financial potential of the university, since from 2017 the Ministry of Science and Higher Education has been awarding **a pro-quality subsidy for admitting the best school graduates**. The University is the institution that has received the highest number of high school graduates in the country and, as a result, received the most funding in this respect ([link](#)).

In 2017, the University of Warsaw received over 12 million zloties of pro-quality subsidies for the 1,516 best secondary school graduates (this is the number of student-subjects, internal data of the University of Warsaw). The Jagiellonian University in Cracow and the Warsaw University of Technology were just behind the University of Warsaw. In 2018, the University was awarded over 11 million zloties in subsidies for the 1,371 best secondary school graduates.

Co-financing which depends on the results obtained in the school-leaving examination by candidates who apply to the University of Warsaw, allows the university to develop above all **individualised education programmes**. The activities of students active scientifically (student research grants, study visits, participation in conferences, etc.) is also subsidised. The largest amount of funds connected with enrolling the largest number of candidates with the best school-leaving exam results went to the Faculty of Law and Administration, the Faculty of Mathematics, Information Technology and Mechanics, MISH College, the Faculty of Applied Linguistics, and the Faculty of Modern Languages.

5. The highest success rate in obtaining grants in Poland

The University of Warsaw's researchers have won prestigious grant competitions held by the Foundation for Polish Science (FNP), financed from the resources of the Operational Programme Smart Growth (link). These programmes are:

- **HOMING**

These are groundbreaking postdoctoral fellowship projects carried out by young postdoc students from around the world, with particular emphasis on exceptional scientists of Polish origin returning to the country.

- **POWROTY/REINTEGRATION**

Innovative postdoctoral internship projects carried out by young postdocs from all over the world, returning to academic work after a break.

- **FIRST TEAM**

Support for the first research teams led by young postdocs from around the world.

- **TEAM**

Support for team projects led by exceptional scholars.

- **TEAM-TECH**

Development of human resources in the R&D sector via team projects led by scientists with outstanding experience in transposing research results to business practice.

- **TEAM-TECH Core Facility**

Projects covering the financing of research teams led by outstanding scientists implementing research and development projects related to the creation or development of services of high importance for the economy.

- **TEAM-NET**

Partnership projects involving large-scale interdisciplinary research and the strengthening of supra-regional cooperation between scientific units.

In 2016–2019 (covering all competitions so far in the current EU financial horizon), **44 projects** have been carried out at the University of Warsaw costing a total of **approximately 102 million zloties**. The University is in this respect the national leader. The most (14) projects are conducted by researchers associated with the New Technology Centre at the University of Warsaw, while 10 projects are run by the Faculty of Physics, 8 by the Department of Chemistry, 4 by the Faculty of Biology, 6 by the Faculty of Mathematics, Information Technology and Mechanics, and 1 by the Faculty of Artes Liberales and the Astronomical Observatory of the University of Warsaw.

The University is also **the only institution in Poland** to host the implementation of **two long-term** projects financed by the Foundation for Polish Science as part of the International Research Agendas programme. Each of the projects envisages financing of around **35 million zloties**.

6. Location in Warsaw and in the region of Central and Eastern Europe

6.1. Warsaw

The Warsaw Metropolitan Area is one of the important hubs in the **global metropolitan network**, which can be seen in its developed capital links within the largest enterprises offering advanced services for enterprises. In the Globalization and World Cities Research Network ranking, **Warsaw was recognized as an alpha-class metropolis** alongside such cities from highly developed countries as Milan, Chicago, Toronto and Frankfurt, as well as cities from developing countries, including Mumbai, Mexico, Kuala Lumpur and Bangkok. This class of city is clearly surpassed only by the 10 most important metropolitan centres in the world with London and New York at the forefront, and among European cities – Paris as well.

In studies devoted to the potential of cities, Warsaw also ranks high.

Table 2. The major European cities of the Future 2018/19 – FDI Strategy

Rank	City	Country
1	Barcelona	Spain
2	Amsterdam	Netherlands
3	Paris	France
4	Berlin	Germany
5	Dublin	Ireland
6	Vienna	Austria
7	Milan	Italy
8	Warsaw	Poland
9	Budapest	Hungary
10	Kiev	Ukraine

Source: C. Mullan, *fDi's European Cities and Regions of the Future 2018/19 – FDI Strategy (Cities)*, "fDi Intelligence" 2018, ([link](#)).

When compared to **European metropolises**, Warsaw boasts a hoast of outstanding features:

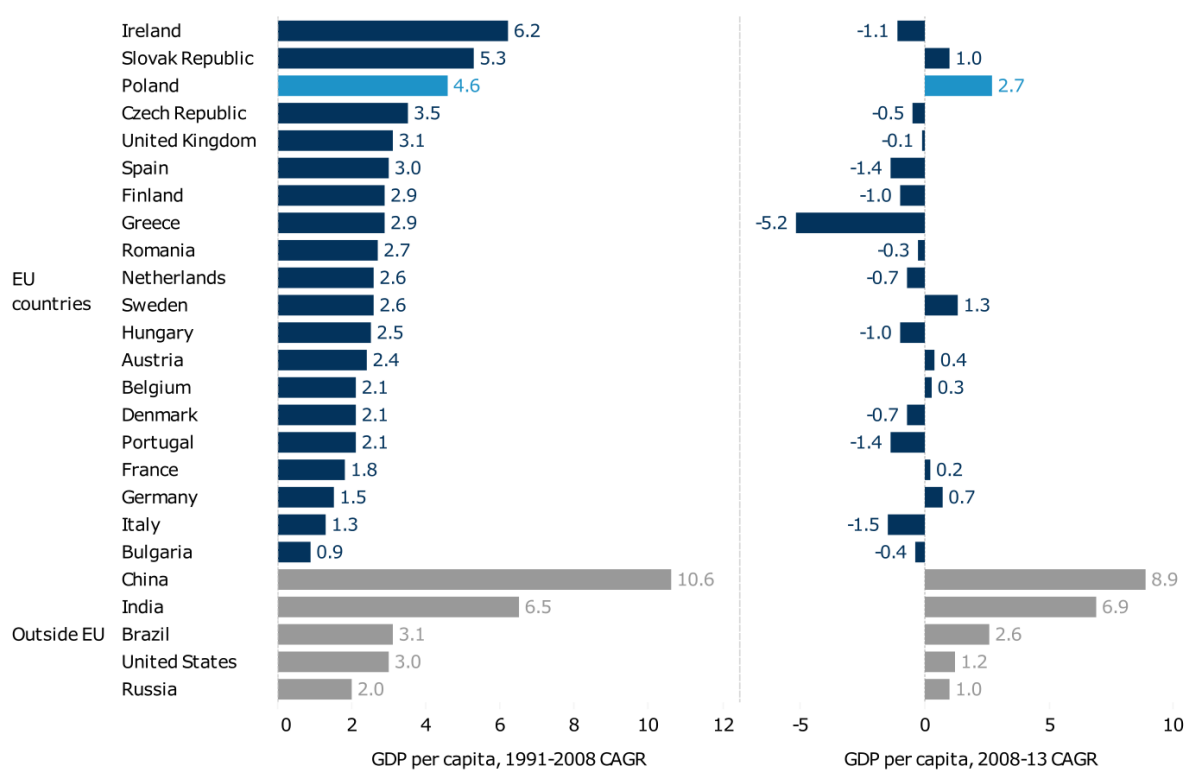
- a **significant level of wealth** in terms of purchasing power (152% of the EU average) and very **dynamic GDP growth** per capita in Euros (in 2008–2016 it reached 28%, while analogous indicators for the metropolitan region of London and Paris (Ile-de-France) amounted to 15% and 11% respectively),
- a **large number of students** (according to Eurostat data 315,000 in the capital's region), behind only the metropolitan regions of the largest European cities, such as London (750,000), Paris (650,000) or Madrid (390,000); in the last five years there has been a 10% drop in the number of students,

- **relatively high expenditure on research and development** (1.7% of regional GDP in the Mazowieckie Voivodeship or 2.0% in the Warsaw region), comparable to the European average, though still significantly lower compared to metropolises such as Stockholm (3.8 %), Vienna (3.6%) or Paris (2.9%).

6.2. The Central and Eastern European Region

The countries of Central and Eastern Europe and the Baltic countries **are developing fastest in all of Europe**. Poland has a distinctive position in this respect – it was one of the fastest growing economies in Europe before and after the crisis.

Picture 5. Compound Annual Growth Rate of GDP *per capita* – EU countries, 1991–2008 i 2008–2013



Source: W. Bogdan *et al.*, *Poland 2025: Europe's new growth engine*, McKinsey&Company, 2015, p. 1.

According to Eurostat data, Poland, Lithuania and Hungary achieved a growth rate of 5% in 2018, while Slovakia and Romania saw growth above 4%. Forecasts for 2019 indicate that the growth rate will be even higher.

The region's development and successes so far in attracting foreign investors suggest that this trend will continue and that **the region will be particularly attractive for investors in knowledge and innovation-based industries**.

According to the EU-Startups report, which monitors the startup ecosystem in Europe, the region has **special advantages related to the development of startups:**

- **the size of the market**

The population of the region is 112 million people.

- **growth**

In recent years, Central and Eastern Europe has been one of the most important drivers of growth in Europe, with real GDP growth expected to exceed the EU average in the future. This means it is getting easier to do business.

- **convenience for business**

According to the World Bank, doing business in many countries of Central and Eastern Europe is easier than running a business in France, the Netherlands or Switzerland.

- **financing**

Startups in Central and Eastern Europe benefit from a wide and growing range of financing sources.

- **global dimension**

Due to the small size of their domestic markets, startups from Central and Eastern Europe must enter their global phase at a fairly early stage.

- **talent**

The region of Central and Eastern Europe is easily recognisable because of its excellent programmers and more affordable workforce than in many other parts of the world.

Being located in Warsaw and the region of Central and Eastern Europe can therefore be considered an important asset. Warsaw plays a key role in the region: it is the main scientific hub and it has a fast developing airport. What is more, in the top ten countries from which the world's best programmers originate, there are four countries from Central and Eastern Europe. Poland ranks third ([link](#)).

Integration of the region, resulting from deepening cooperation within the Visegrad Group at the political, economic and scientific level, is creating favourable conditions related to the European and global emancipation of the region in the eyes of international actors and institutions (see, for example, the CEEC-China 16+ initiative). Warsaw, as the capital of the largest country in the region, plays an important role in driving cooperation and representing the region externally.

Cultural, institutional and linguistic similarities are creating a new, previously untapped potential for scientific, economic and academic cooperation (modelled for example on the solutions of the Nordic Council). The University of Warsaw is becoming an attractive destination for potential students and scientists from Central and Eastern Europe, particularly from those countries outside the EU (e.g. Ukraine, Belarus) and former Soviet republics (e.g. Armenia, Georgia).

Chapter II. Weaknesses of the University of Warsaw as a research university

1. Comparatively weaker scientific disciplines

Many faculties at the University of Warsaw have experienced the effects of an educational boom that forced them to concentrate on teaching rather than conducting research. As a result, some departments are still implementing a very small number of grants. In the scientific evaluation for the years 2012–2016, two departments were designated category B.

Some units, which endeavoured to ensure they had the minimum of personnel in order to teach their study programmes, do not have optimum staff potential when it comes to their scientific development (there is a large proportion of researchers nearing retirement age and without significant publications). Moreover, an assessment of the state of disciplines (subjects) carried out in 2019 showed that in the next round of the evaluation, planned for 2021, some disciplines may not achieve a minimum category of B+. This risk applies to disciplines that:

- are divided between different faculties, which makes it difficult to build common standards (e.g. literary studies and cultural studies are split between four different units),
- do not receive a stable assessment – the results of their evaluations have fluctuated in recent years between A and B (e.g. linguistics, sociology),
- in the last two rounds of the evaluation were given category B (e.g. pedagogy).

Without the support of these disciplines, and the existing islands of excellence within them, and without strengthening them with the help of other disciplines, the University is putting at risk its status of a research university. Because they are important for maintaining the University's diverse offering, they should find a place among the priority research areas surrounded by strong disciplines and transdisciplinary research programmes. This will help bolster the scientific potential of the University of Warsaw.

2. Poor preparation for intensive staff mobility and internationalisation

The University of Warsaw's resources do not currently allow for more foreign students and PhD students, as well as researchers and lecturers, to be accepted. Multiple factors hinder this:

- **material factors regarding accommodation**
 - **places in halls of residence**

According to data for 2017, the University of Warsaw has 2,578 places in six halls of residence. Only about 30% of these places are up to international standards

(single rooms and multi-person apartments with separate rooms, their own bathroom and access to a well-equipped kitchen). These places are difficult to allocate: earmarking them exclusively, or mainly, for foreign students is (correctly) frowned upon by the academic community.

In the multi-year programme “University of Warsaw 2016–2025” (see item 4 on the list of opportunities), over the next five to eight years four additional student halls of residence are planned. This means that over the next few years it will be necessary to solve the issue of accommodation in a different way (e.g. via a contract with external entities), which is associated with additional expenditure.

- **places in university hotels**

The University has 69 places in Hotel Hera on Trakt Królewski road, near Łazienki Park. The hotel, however, requires a major refurbishment (the issue is currently delayed due to various claims on the property). On the other hand, the DPN (“Building for Scientific Workers”) at the Służewiec Campus has 48 places, but they are not fully available to guests due to Polish employees of the University of Warsaw living there long-term.

Although the long-term plan envisages the construction of an international-standard university hotel, in the coming years a different solution will be needed (e.g. a contract with an agency to rent a certain pool of apartments or an agreement with a developer that builds blocks of apartments for rent), one that again involves financial outlays. This investment requires careful analysis, the development of a business plan and allocation of funds.

- **available workspaces**

Most faculties, especially those involving the humanities and social sciences, do not have workspaces of a good or acceptable standard (offices, coworking spaces, hot desks, etc.) that can be used by staff arriving from abroad. This problem cannot be solved by allowing these guests to use the workspaces of Polish employees who are at that moment abroad (on a scholarship, giving lectures), because in many departments employees not only lack their own office, but even a designated desk.

The multi-year plan envisages 14 new investments in this area. Modern buildings will be erected that are fully adapted to academic needs. The first of them, however, will only open in 2.5 years’ time. Until then, another solution is needed, requiring careful analysis and planning. It is known that the number of students will decrease, especially if the University of Warsaw obtains the status of a research university; academic staff will also see changes. This will lead to the possibility of “freeing up” a certain amount of workspaces. The University has certain opportunities due to its close partnership with the City of Warsaw, as shown by the Academic Warsaw Initiative, signed in April 2017.

- **available social spaces**

Foreign universities, especially the renowned ones, try to provide their employees with access to social spaces, not only those that allow for the preparation and consumption of meals, but above all those that encourage joint work, meetings and gatherings, and the closer integration of the entire academic community. However, most University of Warsaw departments lack such spaces. Social interaction amongst employees and students is not encouraged by the scattering of campuses and the “clumping” of certain groups of employees and students. For some units, there is also a problem with the financing of this type of space. Without a strategy and a coherent policy for creating such places – and without any financing via the central budget – one cannot expect them to be created. This lowers the attractiveness of the University not only for students and doctoral students from abroad, but also for foreign researchers.

- **material factors linked to service systems**

- **information systems**

Systems that allow University of Warsaw students and staff to deal remotely with matters (enrolment, course management, etc.) are increasingly being adapted to stakeholders’ needs and changing expectations. Currently, one can, for example, remotely register for a course or class, check a grade, contact a lecturer, and fellow students from one’s group. Although they receive no shortage of criticism, the level of these systems can fairly be described as good. However, there is no system for handling employee issues, which causes a lot of trouble for guests from abroad.

Including existing processes in one system would, however, retain their current complexity. Therefore, before such an IT system is introduced, a review of the University’s procedures and organisational structure must precede it to allow for their simplification. This exact action has been planned in relation to the implementation of a new legal Act (new regulations will be created with rewritten rules regarding how the University’s work is organised).

- **availability of documents and forms in foreign languages**
- **physical and psychological availability of information to help find one’s way around the University of Warsaw**
- **an internal communication system to facilitate contact amongst employees**

- **competence-related factors linked to properly training employees who aid teaching and research processes at the University of Warsaw, and factors relating to the competencies of academic teachers**

- **linguistic competencies**

University of Warsaw administrative staff, especially those employed at faculties and institutes, often do not speak enough English to communicate freely with foreign students, PhD students and employees regarding various everyday matters. Although training sessions and courses for this have been conducted for the last three years, not everyone has the chance to participate in them. In addition, ways for staff to consolidate what they have learned should be provided. This requires good planning of training programmes, and potentially the implementation of completely new solutions.

The University has not come up with any systems for developing language competencies amongst academic teachers, neither regarding teaching nor in relation to publishing the results of scientific work. Naturally, some of the University's academic staff, especially those who worked abroad for some time, have developed such abilities. However, there are still many researchers who do not publish in English, even though they produce world-class work. There is surely no need to mention that the cost of professionally translating scientific texts is high in relation to wages. It would seem, therefore, that supporting these people could bring surprisingly quick results.

- **social competencies**

In the past, the University did not provide its employees with systematic, well-thought-out and planned training sessions for developing soft skills. However, these would seem indispensable in an academic work environment: they enable efficient and effective communication, and they help one deal with conflicts, initiate collaboration and teamwork, and also give and receive feedback. Without promoting such competencies, the University of Warsaw will fail to be an attractive place to conduct research and learn. This issue applies equally to academic staff and administrative employees.

While administrative staff have been covered by the training programme for three years, including a special leadership programme, such a system would have to be created for academic staff from scratch. One important barrier may be the attitudes of the employees themselves; they generally are somewhat defensive when it comes to this kind of self-development.

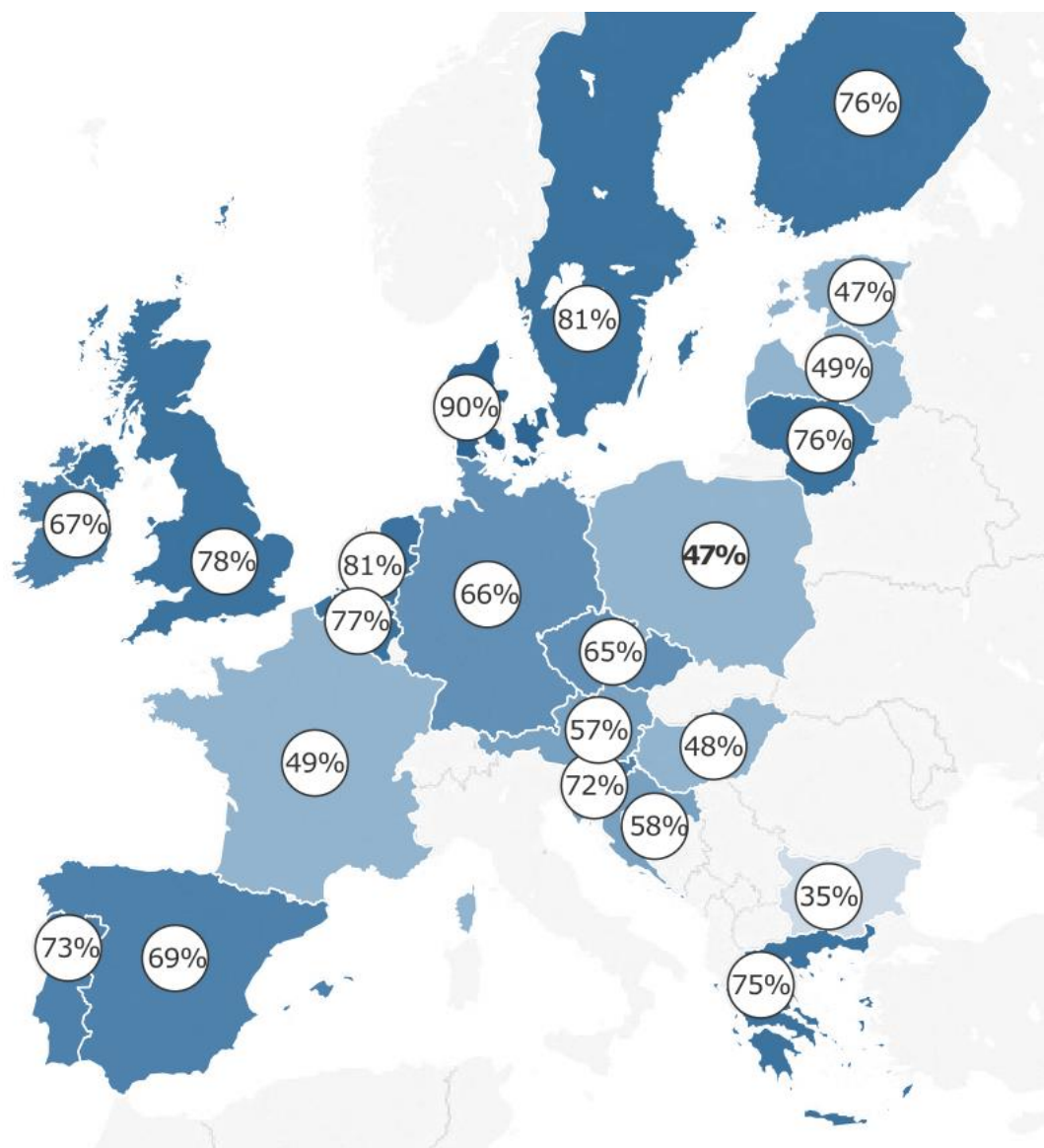
- **digital competencies**

The implementation of new IT solutions (including in teaching) requires the strengthening of the digital competencies of academic staff and administrative employees. At their current level, they do not allow for the effective use of modern

technologies, especially by the older generation. This even applies to the system for managing academic courses and the anti-plagiarism system, the Dissertation Archive, and the Polish Scientific Bibliography, which have been used at the University of Warsaw for a considerable length of time. This lack of skills is accompanied by unwillingness and defensive attitudes, making it seem even more important to support people who are digitally excluded.

The staff's level of digital competence at the University of Warsaw seems to correspond to the general state of affairs in Poland. The percentage of people with a PhD whose digital competencies are higher than basic does not exceed 50% in Poland, which is noticeably different from that in (Western) Europe. Poland is ranked 22nd in Europe in this respect ([link](#)).

Picture 6. Percentage of people with a PhD that have higher than basic digital competencies



Source: DESI Eurostat data.

Solving this issue requires financial outlays to be spent, for example, on supplementing salaries for librarians or engineering/technical employees. At foreign universities, people in these positions constitute an important development resource (see, for example, the following job offer: [link](#)). A good platform for supporting employees seems to be the newly created Digital Competence Centre, created in accordance with the multi-year programme “University of Warsaw 2016–2025”, but it requires the employment of additional people.

3. Lack of an effective system for managing knowledge, research infrastructure, and research

The University’s teaching activities are supported by IT systems facilitating enrolment of students and course management. They have been providing significant amounts of data for many years, which allows for the monitoring of key indicators, identifying trends and conducting strategic analyses. The University does not have analogous systems for scientific activities. (Systems created by the Ministry of Science and Higher Education, such as PolOn and PBN, are slight exceptions, but access is limited and their construction was intended for other purposes). **There is therefore a lack of key data for the evaluation of scientific activities and the development of research development strategies.**

Research projects are currently only registered in an SAP system (budget control) and they are internally documented – in files of various formats and with diverse layouts created in offices and research service sections, both at the central level and in faculties and research units. **The diverse nature of the file formats, their unsystematic character and the lack of common data collection standards prevent their effective consolidation.**

Strategic planning, and systematic support for the development of science at the University of Warsaw, are hampered by deficiencies in the following areas:

- **database of ongoing/completed research**

This database should contain information not only about research carried out as part of grants, but also about commissioned work, that won in tenders, etc. It should take into account not only the financial value of projects and their general characteristics (the discipline, the staff involved, the lead researcher, the university’s own financial contribution, researchers employed, etc.), but also their:

- contribution to science – publications (in particular foreign ones), patents, conferences and talks at conferences, scientific collaboration established as part of the project, etc.,
- contribution to staff development (especially young researchers) and the development of career paths – defended PhDs, forms of employment for young scientists, scholarships for PhD students, etc.,

- contribution to international staff mobility – employees arriving or going somewhere else,
- long-term nature and results – how the project can continue and how its results will be used (commercialisation, accreditation, inclusion in everyday activities), relations with partners, new partnerships, etc.

Such a database should be linked with various systems registering individual achievements (the Polish Scientific Bibliography, Scopus, Web of Science) and with a database of research infrastructure (other created databases, network resources, etc.). Assigning researchers to particular disciplines will allow us to monitor the quality of these disciplines. Information about completed projects will also be able to be used in competitions (e.g. EIT) and in tenders that require documentation of experience in conducting a given type of research.

- **database of research infrastructure**

Without such a database, it is not possible to use the research infrastructure to its full potential (duplication of equipment purchases, etc.). By collecting information on this subject, one can more precisely determine how long devices will be usable and better plan budgets (repairs, servicing, purchase of consumables, etc.). In many University departments such databases are in use, but due to different recording standards, they are difficult to use effectively.

- **database of researchers**

Such a database would make it easier to find a partner(s) for the University in order to exchange experience and to collaborate. Such a database has been created at the University's Technology Transfer Centre, but it only included researchers interested in working with industry. Hence, a database containing the profiles of researchers from the entire University of Warsaw would be highly desirable. Potentially, it already exists in a standardised version in documents prepared for evaluation needs, which means that its creation would require a relatively small amount of work.

The creation of an IT system to support monitoring, evaluation and analysis, which will lead to the development of a strategy and the shaping of a scientific policy, is a vital condition for any higher educational establishment aspiring to attain the status of a research university.

4. Insufficient support for employees when conducting scientific and teaching activities

From March to June 2018, as part of preparations for the implementation of the new Act at the University of Warsaw, a series of meetings was held to ponder together expected – if not indispensable – solutions **needed** in key areas of the university's operation, in particular in teaching and research. Almost 400 people attended the meetings: employees, PhD students and undergraduate students of the University of Warsaw. The report has been made available to all ([link](#)).

Participants agreed that the University's academic and intellectual potential is not fully realised due to **insufficient institutional support**. In the area of research, the following problems were identified:

- **instability in research teams**

A lack of support in the periods between grants causes a loss of colleagues and, consequently, the break-up of well-functioning teams. This problem could be prevented – according to the employees – with the introduction of small institutional grants, allowing a promising team to be maintained until the next grant is received.

- **lack of concern for the long-term nature of results**

The University does not provide support for the sustainability of (valuable) projects after the financing ceases. Sometimes, apart from indirect costs, the importance of research for the faculty, or the University as a whole („research is a researcher's affair”), is not recognised.

- **insufficient support for the research process**

- **legal issues**

Expert support would raise the question of issuing syndicate and international agreements, as well as tax issues (VAT eligibility, public procurement, contracts with foreigners, etc.).

- **preparing an application**

There are still faculties at the University of Warsaw that do not have their own research service section, while central offices may only deal with interested parties to a limited extent. First and foremost, competent advice is lacking at the initial stage, and it would avoid risk and potential problems in the future.

- **implementing a project**

Thanks to support in this area, problems could be flagged in advance. At the same time, in many faculties the research service section currently only deals with expenditure accounting.

- **availability of research competencies from other fields**

The meetings helped ascertain that humanists need statisticians and people with IT competencies, while those involved in social sciences have a need to collaborate with data mining specialists.

- **servicing laboratory apparatus**

Working with modern devices requires particular qualifications, while there still seems to be too few laboratory staff. Servicing apparatus should not take up the time of the researchers conducting the project.

- **separation of research and teaching at the financial level**

Conducting research and educating students are two sides of the same coin, especially at the doctoral level. If the best researchers were able to teach classes, it would undoubtedly make courses more attractive.

In relation to teaching, employees declared their desire to develop themselves and a readiness to raise the level of education. At the same time, they noted the inflexibility of syllabi that do not always keep pace with the development of a discipline and/or the needs of the labour market. They emphasised the need to involve students in conducting research. At the same time, they indicated a number of **organisational (administrative) barriers**:

- **difficulties in combining professional duties**

The employees feel torn between scientific, teaching and administrative duties, which is why making the management of duties more flexible is necessary, in particular making it easier to report one's hours worked.

- **inflexible organisation of the teaching year**

The teaching year does not allow for the grouping of classes in units shorter than a semester. This makes it difficult to travel abroad and conduct research, especially during periods of heavy workload.

- **bureaucratisation of teaching**

The requirement to write up, translate and place syllabuses in the IT system takes the employee a lot of time.

- **shallow evaluation**

The results of evaluations do not allow for much reflection (e.g. identification of strengths and weaknesses) and do not translate into a programme for improvement.

- **lack of a system for improving teaching competencies**

- **underappreciation of teaching efforts**

In many faculties, the employee cannot include time spent advising doctoral students in their list of hours worked (even *ex post*, i.e. after they have received their degrees).

- **lack of mechanisms for sharing knowledge**

In programmes aimed at improving education (formerly PO KL, currently PO WER), no methods have been developed to make developed solutions enter wider circulation. For example, in the Modern University programme, competent coaches observed classes to help staff identify strengths and weaknesses and to recommend activities. After the end of funding, the observations were abandoned.

Employees perceive there to be insufficient support in conducting research and teaching, including in the broader context of **the University's ability to coordinate, create policies, and manage efficiently**, including managing human resources. Over 3,000 people are employed in administering the University; therefore, the problem is not so much a lack of staff but a lack of good organisation at work, a clear division of tasks, and supporting the development of competencies.

5. Lack of a coherent and transparent policy on human resources management and employee development

It is telling that **there is no HR department at the University of Warsaw**, one dedicated to human resources management, but just an Employee Affairs Office, whose name and scope of tasks originate in the past, when the limited-in-scope “kadry” department dealt with employees. In 2016, the University introduced an SAP system, but selected only two modules from the employee service support modules available: HR and Payroll (so-called hard HR).

Human resources management has been divided between „headquarters” and the faculties, while the employees at the faculties, both academic teachers and administrative staff, are subordinate to the dean. The authorities and central offices managed to keep only the elements of hard HR under their control (HR data, employment, managing employment issues like leave, etc.), while remuneration, promotions and development of employees remained the responsibility of each dean. As a result, employees' situations are not balanced: relatively „rich” faculties provide higher pay, and sometimes even training sessions.

Since 2013, the University has been operating a central training system for administrative employees, financed from university-wide resources. However, this is just a drop in the ocean regarding needs. The Rector also appointed a coordinator, a person with extensive experience in public institutions and in a State Treasury company. This person **drew up a strategy for the development of human resources management at the University**. Its implementation requires organisational changes and consistent financial outlays.

6. Inadequate preparation for internal collaboration and building relationships with stakeholders

Faculties' territorial dispersion, and system-underpinned tendencies to autonomy, are not conducive to internal collaboration. This problem is perceived not only by the authorities, but also by staff, who believe that the most serious problem in work culture at the University is insufficient cooperation between people and between faculties (see the report from the research entitled „Our University”, [link](#)). This is due to two reasons. The first is group divisions (administration and academics; headquarters and faculties; strong and weak departments, etc.) **and the dominance of individualistic strategies**. At the same time, **the sense of there being a common good is too low and ties with the University as a whole are too weak**. However, it should be remembered that both reasons are strongly related to the organisation and mechanisms of the University's operation. In addition, one could mention:

- **insufficiently effective internal communication channels**

When searching for information, University employees and students generally use the faculties and institutes' webpages rather than the University's homepage. Few people know about the existence of our internal website ([link](#)). Because of this, the most effective way to deal with matters that escape the boundaries of organisational silos is for the administration to create a special task force, gathering representatives of all offices and delegated to solve a specific problem. However, this requires the inclusion of a person who is highly placed in the power structure (e.g. prorector, rector).

- **lack of owners of internal communication processes**

Such a faculty would not only need to take care of the physical and psychological availability of information, but also support interaction between employees. There is certainly a lack at the University of Warsaw of thoughtful, planned involvement of staff in employee picnics, the Science Festival or the participatory budget. It would also be worth creating the right conditions for jointly consulting on matters important to the community. It is equally important to introduce new undergraduate students, PhD students and employees to issues that affect the University of Warsaw and to provide them with basic knowledge about the university in a user-friendly form. Lack of an „owner” translates into a lack of a strategy for building the ability to work together.

- **low importance of extra-departmental initiatives**

Teams and programmes that spill out over the boundaries of faculties still have insufficient room in the hierarchy of importance at the University of Warsaw, and thus – the principles for supporting and financing them have gone unspecified. The reasons for this are the inflexibility of the University's organizational structure and the often reluctant attitude of the faculties themselves. It would therefore be appropriate to give such initiatives the right priority and budget.

The University also has a poorly developed institutional capacity to build relationships with the outside world:

- **lack of a strategy for building relationships**

The University of Warsaw has not yet drawn up principles for establishing and maintaining relationships with the outside world. Meanwhile, these relationships are associated with various recognised risks and therefore require a very conscious policy.

- **atomisation of faculties**

Building relationships is one of the basic tasks of faculties at the University of Warsaw, however, they work in isolation and without communicating with each other (compare graduate clubs). At the university level, there is no separate unit (office) to which institutions, non-governmental organisations, and companies interested in cooperation with the University could turn to.

The University's Technology Transfer Centre is of great importance for building external relations, and it has been attracting partners and driving cooperation for more than two decades, most recently as part of the University of Warsaw's Incubator. The University Volunteer Centre also deserves attention since it has built a network of partners – mainly non-governmental organisations and public institutions – and increased the ability (mainly of students) to undertake *pro bono* projects in collaboration with entities from general society. Without the creation of a platform that combines such initiatives and drives joint projects, including of a research nature, the University of Warsaw will not be able to effectively realise its potential. Development conditions here are highly favourable, because the University has an excellent reputation that makes many entities interested in partnering with it.

Chapter III. Opportunities of the University of Warsaw as a research university

1. Federalisation with the Medical University of Warsaw

Both the University of Warsaw and the Medical University of Warsaw (MUW) have many years of experience in research collaboration, they also know the research they carry out in depth, and they accurately recognise their scientific competencies.

The Centre for Preclinical Research and Technology ([CePT](#)) is a joint venture by the University of Warsaw and the Medical University of Warsaw, and it is **the largest biomedical and biotechnology venture in Central and Eastern Europe and, at the same time, the largest investment in science in Poland**. As part of the CePT, located at the Ochota Campus in Warsaw, a comprehensive biomedical research centre has been created consisting of 10 local scientific centres working in close cooperation. Apart from the University of Warsaw and MUW, the CePT also includes other leading scientific and research institutions in Poland. The CePT already oversees joint interdisciplinary basic research and research on new diagnostic and therapeutic methods – to tackle the most common lifestyle diseases (cardiovascular disease, nervous system diseases, neoplastic diseases, and those related to the ageing process).

The potential for federalisation has also been proved by the successes of **spin-offs** set up by University employees, **working in the fields of diagnostics, drug design and therapy** (AmerLab, Matariki Bioscience, Nephrolab Plus, Microanalysis, Spekrino). One company called Warsaw Genomics, dealing with modern genetic research, deserves particular attention. This entity is a joint venture by The University of Warsaw and MUW scientists.

One breakthrough in commercialising the field of biomedical sciences at the University of Warsaw has been the purchase by two international pharmaceutical companies of licenses to use mRNA research results obtained by a team lead by prof. Jacek Jemielity from CeNT. Their **method of increasing the durability and productivity of mRNA** is being used for further work on a **personalised anti-cancer vaccine**.

The way scientific disciplines compliment each other may give both universities a development push to achieve a synergy effect in such areas as: personalised medicine, medical diagnostics and modern therapies, drug design, demography, research into ageing and the labour market, food and health. These areas, to a large extent, coincide with the topics of research included in the agenda of the [4EU+](#) alliance of European universities, of which the University of Warsaw is a member.

As part of the federalisation of the University of Warsaw and MUW, the following shall be created:

- **joint research platforms,**
- **joint infrastructure centres,**
- **joint, integrated commercialisation platform,**
- **joint doctoral school.**

The selection of these initiatives has been based on the results of an analysis carried out by Times Higher Education commissioned by the University of Warsaw and MUW (*University of Warsaw / Medical University of Warsaw Analysis & Benchmarking Report, THE 2019 WUR*). The results are summarised in a table that lists 13 aspects taken into account in the THE ranking. It should be remembered that MUW has not been included in the rankings so far, therefore its position was calculated based on institutional data.

The table shows the estimated combined results for the University of Warsaw and MUW (first row), and then the results for MUW (second row) and the University of Warsaw (third row) separately. For each assessment aspect, green marks the best result, and red the worst.

Table 3. UW+MUW and MUW – estimated metric scores – compared with UW's existing metric score – THE WUR 2019

		Teaching					Research			Cita- tions	Indu- stry Income	International Outlook		
Institution	Overall score	Doctoral, bachelor degrees awarded	Doctoral degrees awarded, academic staff	Teaching reputation	Institutional income / academic staff	Staff student ratio	Publications / staff	Research income / academic staff	Research reputation	Citations	Industry income / academic staff	International staff	International collaboration	International students
UW +MUW	29.3	45.6	24.4	16.6	24	59.4	21.1	36.5	11.3	39.7	34.4	27.6	45.2	41.8
MUW	22.1	89.1	17.9	1.6	19.6	95.1	13.5	26.8	0.8	29.4	34.8	21.1	15.6	37.5
UW	31.3	41.9	28.1	15.3	26.3	48.7	25.7	41.8	10.6	44.7	34.2	31.2	60.8	42.6

Source: University of Warsaw / Medical University of Warsaw Analysis & Benchmarking Report, THE 2019 WUR.

The combination of the University of Warsaw's and MUW's potentials will have a positive impact primarily on *teaching reputation* and *research reputation*, which is exactly the effect that underlay the decision to begin work on federalisation. The University of Warsaw can benefit if it opens a doctoral school with MUW (in terms of *doctoral degrees awarded* MUW is better) and if it launches a common commercialisation platform (MUW achieves a better result when it comes to *industry income*). In eight aspects the University of Warsaw is rated higher. This allows us to feel sure that both institutions will benefit from federalisation.

2. Participation in the 4EU+ European University Alliance of research universities

The 4EU+ Alliance brings together six research universities that are applying for the status of a European university in a competition run by the European Commission. The alliance includes: University of Warsaw, University of Sorbonne, University of Heidelberg, Charles University in Prague, University of Copenhagen and the University of Milan. At the end of February 2019, the 4EU+ Alliance submitted a proposal in a pilot competition run by the European Commission called “European Universities Initiative,” financed by the Erasmus+ programme.

Participation in the alliance gives the UW a chance to improve many aspects of its activities. As the tabular data shows, the remaining universities in the alliance obtain better results in these areas.

Table 4. Comparison of the results of universities associated in networks

	Numbers		International rankings (ARWU)		H2020 funding			Erasmus+		Membership of existing networks
	Student	Academic Staff	Global	National	Total M€	Rank – national	ERC – number	Total projects	Rank – national	
Heidelberg	29 689	5 910	47	1 st	53 M€	6	22	26	9 th	LERU, Coimbra Group, EUA
Charles	51 438	4 057	201–300	1 st	17 M€	1	6	60	2 nd	LERU-CE7, EUF, UNICA, Coimbra Group, EUA
Sorbonne	55 600	3 400	36	1 st	53 M€	1	18	22	9 th	LERU, UNICA, EUA
Milano	59 000	2 159	151–200	1 st	36 M€	6	8	42	8 th	LERU, EUA
Copenhagen	38 615	5 166	29	1 st	190 M€	1	55	41	3 rd	LERU, IARU, UNICA, EUA
Warsaw	54 800	2 992	301–400	1 st	19 M€	1	6	43	4 th	LERU-CE7, EUF, UNICA, EUA

Source: 4EU+, *Mission Statemen. February 2019*, 4EU+ 2019, ([link](#)), p. 4.

The University of Warsaw’s opportunities can be seen in the following areas:

- **full integration of mobility as part of joint educational programmes**

Building a university system with campuses in six European countries will enrich the University of Warsaw’s educational programmes and strengthen international cooperation. This requires a significant increase in the mobility of students and employees, but also better integration of teaching programmes. This will help make mobility an element of students’ education and at the same time, increase their employability in the European market.

In addition, any educational structure should be structured to ensure clear and well-integrated periods of mobility in all study programmes. A smooth flow between the institutions in the alliance will allow us to meet the needs and preferences of students and employees and will expand their participation in international exchanges.

- **common frameworks oriented towards challenges in education**

The transition from a model in which courses are created by one institution, to a multi-agency formula, containing courses offered by six universities, will allow us to focus educational programmes, so that they better meet modern demands. It will also be possible to personalise (individualise) these programmes, a strength of which will be the combination of academic degrees with micro-credentials.

- **increased integration and balance**

Despite clear progress in this area, European educational and research networks – as is the case in the labour market – are still largely defined by national, cultural and linguistic borders. Participation in the alliance will help reduce the imbalance of the current flows of students and scientists and the clear preference for certain subjects, often combined with brain drains (especially from the master's degree and upwards).

According to the plan submitted in the EC competition, by 2025 the 4EU+ Alliance will have become a truly integrated university system. **It will enable harmonious mobility and integrate the physical and virtual campuses of the universities belonging to the alliance.** Students will receive, as part of their educational programme, full access to the courses, research infrastructure, grants and internships, libraries, and social facilities of all six universities. Also, in this way, scientific and administrative staff will get a strong incentive to create and develop courses or research projects throughout the university system. Finally, the alliance of six universities will provide economic partners, NGOs, and societal partners with direct access to both the large student community and their broad specialist knowledge.

3. Poland's new scientific-research policy

Until 2018, the science and higher education sector was governed by four laws and a large number of regulations. The Law on Higher Education, along with ordinances establishing the subsidy allocation algorithm for teaching, was of fundamental importance to the University. (For most universities, this subsidy was and still is a basic, stable source of financing for their activities, constituting from 75% to almost 100% of revenue).

The above-mentioned names of documents and financial streams clearly indicate that from the point of view of state policy, **the most important task of a university was education.** The subsidy related to the quality of scientific activity (called the “Bst”) was an order of magnitude lower than the teaching subsidy (for the University, the teaching subsidy amounted

to 623,206,600 zloties in 2018 and the BSt fund was 53,686,500 zloties). The importance of the research factor in the basic (teaching) grant algorithm was 0.1, and the way it was spent basically excluded investments to promote scientific excellence.

As a result, **scientific research was financed solely from grants** – and only marginally from orders from the industrial sector, *inter alia* due to limitations in tax regulations.

In practice, this did not allow for the creation of coherent, long-term research programmes with stable funding to enable a team to also function in the period between grants. Moreover, it was difficult for universities to create a policy for the development of science or a strategy for enhancing excellence by harnessing the potential of the entire institution, because the law in force in 2005–2018 granted powers to faculties when it came to teaching, research, and the awarding of academic degrees.

The new Act's very name, the "Constitution for Science," indicates a change of emphasis. **Undoubtedly, it creates a chance for universities – including the University of Warsaw – to develop a long-term strategy for the development of science and ensure stable funding for this strategy.**

From the University of Warsaw's point of view, the most important changes introduced by the new Act are as follows:

- **all powers have been located at the university level,**
- **subsidies, previously dispersed, have been replaced with a single subsidy,**
- **universities have been given the freedom to define their internal organisational structure,**
- **"research university" status has been introduced based on criteria related to scientific excellence,**
- **universities have for the first time gained the ability to draw up and implement policies and strategies.**

In order to provide support for the implemented changes, the Ministry of Science and Higher Education has launched two programmes, one of which is to support excellence in education, and the second – scientific excellence (the "Initiative of Excellence"). Each of these programmes will provide universities that create a coherent development strategy with increased funding amounting to 10% of the subsidy. The Initiative of Excellence, if the university regularly attains the declared level of indicators, is a programme with an essentially unlimited time horizon. This allows for on-going evaluation during programme implementation, and ongoing correction of the science improvement strategy. Both programmes also provide financial support for activities in the field of human resources management, in particular young talent, and mechanisms to improve management.

4. Synergy between change and development programmes introduced at the University of Warsaw

The University is currently implementing two general university development programmes:

- **multi-year programme “University of Warsaw 2016–2025”**

The main goal of this government programme, which is providing the University with nearly 1 billion zloties to implement 18 investments ([link](#)), is to revive the potential of the humanities and social sciences. The newly created infrastructure is meant to support:

- transdisciplinary research programmes,
- internationalisation of the university,
- innovative forms of teaching and programmes for lifelong learning,
- academic entrepreneurship,
- quality of public life.

As a result of the programme at the University of Warsaw, modern buildings will be erected that will foster innovative forms of education and teamwork, as well as good quality halls of residence and guest houses. The newly created space is meant to be open to industry and residents, thanks to which it will be possible to develop cooperation with industry, citizen science, and carry out popularisation activities.

Transdisciplinary research centres will invigorate cooperation between scientists from different fields, and by using the potential of strong disciplines – they will support relatively weaker fields. This idea is being put into practice by the **Digital Humanities Laboratory (LaCH)**, combining IT and mathematics with the humanities, and the **Digital Economy Laboratory (DELab)**, combining economics and IT with sociology and law.

The University has planned the implementation of the long-term programme in such a way that this process itself is a tool for change. Students also participate in work on functional and operational guidelines, and thanks to this they get to know each other and get to know the University of Warsaw better. Most importantly, they also discuss how the university is developing when it comes to global architectural trends and modern teaching solutions, including support for soft skills and team work. Together, all this prepares the ground for future collaboration.

The multi-year programme supports the implementation of the Initiative of Excellence in a vital way. The newly created space for transdisciplinary teams also provides ideal conditions for collaborating teams within priority research areas. Halls of residence can be a social base for students, PhD students and employees from foreign research centres.

Teaching rooms and spaces for teamwork, built with the use of innovative solutions from around the world, will allow us to educate in new, experimental forms.

- **Integrated Development Programme (as part of PO WER 3.5)**

The aim of the programme, which has been ongoing at the University of Warsaw for two years, is to support the implementation of the following systems at the university:

- improving education – the mechanisms are being tested in 20 experimental MA programmes developed in cooperation with employers and partners (including entrepreneurship classes, project classes, etc.)
- improving competencies of academic teaching staff,
- developing competencies of administrative staff,
- monitoring key indicators regarding enrolment and education.

The Integrated Development Programme is oriented towards improving education, which makes it a perfect complement to the science improvement programme. It can be assumed that the mechanisms will be mutually reinforcing, which will ensure the sustainability of results and that changes are deeply rooted in the functioning of the University.

5. HR Excellence in Research and managing human capital

For several years the University has been expanding its potential in the field of human capital management. Thanks to the developed initiatives – in combination with the possibilities offered by the Initiative of Excellence – the results of managing and organising scientific research may get better and better. Improved competencies of researchers from the University of Warsaw are also significant.

Since 2016, the University of Warsaw has received the distinction of **HR Excellence in Research** from the European Commission. This confirms that the university adheres to the principles of the European Charter for Researchers and the Code of Conduct when recruiting researchers. This distinction commits us to continuously improving our personnel policy, which the University implements with the help of the Human Resources Development Strategy at the University of Warsaw (HRS4R) together with an internal analysis and action plan for 2015–2019 ([link](#)).

In recent years, the University has been actively implementing the **European Charter for Researchers** and developing modern tools for human capital management. The physical result of these activities are posts, teams and documents serving the University community, such as:

- **coordinator for HR management,**
- **team to organise training courses and workshops,**

- **regular employee workshops, currently aimed at administration and services,**
- **electronic guide called “Vademecum zatrudnienia” (“Employment Handbook”),**
- **“Welcome Point UW” website for students (and ultimately also scientists) from abroad,**
- **service for searching for mobility opportunities.**

Moreover, the University has undertaken a number of activities to encourage equal treatment and non-discrimination, the idea of which is to promote the full use of our potential, including scientific potential, human potential and that of marginalised groups. As a result of these activities, the following have come into being:

- **academic advocate for student and employee affairs** (since 2011, the first institution of this type in Poland),
- **main specialist for equality at the University of Warsaw** (from 2016),
- **equality workshops,**
- **anti-discrimination guide for those studying and employed at the University of Warsaw** ([link](#)),
- **Gender Equality Plans** for three University faculties (the Faculty of Law and Administration, Faculty of Economic Sciences, Faculty of Physics)
- **Gender Equality Plan for the University** (to be prepared).

The requirements of HR Excellence in Research and the human resources development programme implemented at the University of Warsaw are also a good starting point for activities in this field in the context of the Initiative of Excellence. With this in mind, it is necessary to propose such investments and activities as:

- planning researcher recruitment,
- mechanisms of internal evaluation,
- model for planning the research work of faculties,
- individual plans for researchers' development,
- publication strategies for University faculties,
- strategy for seeking grants and conducting research activities,
- coherent (electronic) system for managing scientific work,
- improving motivation amongst employees achieving the best scientific results,
- monitoring researchers' remuneration around Poland and Europe,

- development of the competencies of scientific staff (workshops, mentoring, coaching, talent management, etc.),
- support to help better present scientific achievements (project and team management, self-presentation and image, website development, etc.),
- career counselling,
- consistent policy for building the University brand as a research centre and employer (employer branding),
- adaptation and relocation programme for arriving researchers (administrative, tax, living issues, etc.),
- bilingualism as standard for the functioning of the university (language training for staff, continual translation of all documents and letters, bilingual labelling of buildings and infrastructure).

The above activities to strengthen the HR Excellence in Research brand and use our previous experience in human capital management at the University of Warsaw, will have a real impact on the achievement of Objective 3 in the Initiative of Excellence (getting undergraduates and PhD students involved in research, competing to enrol the best candidates, and talent management). Above all, however, they will contribute to the implementation of Objective 4 (the preparation and implementation of comprehensive solutions for the professional development of university employees, in particular young researchers) and Objective 5 (improving the quality of university management).

6. Growing demand for expert analyses and research

In the present world, there is a growing sense of multidimensional crisis, which has all the features of a wicked problem. And so, climate change causes the desertification of large areas of the world, and consequently, the reduction of food security as well as migration movements. They are also a threat to biodiversity and human health. The financial crisis and growing economic inequalities bring a number of social problems that translate into troubling political phenomena (e.g. increased support for populist movements), and anti-scientific moods (e.g. anti-vaccination movement). Changes in the balance of power in the international arena, including the growing power of China as well as the demographic potential of Asia and Africa, are not only of political significance: they are also closely related to climate change, since China's economic growth is taking place with the use of technologies that are risky for the environment, and the dynamic rise of the middle class is shifting to a rapid increase in consumption. All these phenomena illustrate the unsolvability of the problem in question: different groups of stakeholders have different and sometimes conflicting interests.

At the same time, there is growing awareness that efforts to solve or even mitigate the effects of this multidimensional crisis require solidarity on a global scale. As a consequence, they were at the top of the list of priorities of the most important international organisations. And so, the European Commission has announced Action for the Planet, containing 10 initiatives for modern and clean economy. In 2015, the UN declared the agenda of actions towards sustainable development, adopted unanimously by all 193 member states.

This results in an increase in expectations for the world of science, and research programs related to the search for solutions for the Earth are given visibility and weight. As already pointed out in other sections of this analysis, **the UW has exceptionally strong scientific resources on climate, biodiversity and health issues, and actively co-creates and implements international programs operating in these areas.**

An opportunity for the University of Warsaw is also the growing importance of research into digital transformation and the fourth industrial revolution related to modern technologies. **Also in this area the resources and achievements of the University of Warsaw are significant, which may become the basis for a developmental jump.**

Chapter IV. Threats for the University of Warsaw as a research institution

1. The fall or stagnation in the University of Warsaw's position in international rankings

The situation at the University is being more and more influenced by global rankings, first of all by:

- **Academic Ranking of World Universities** (ARWU, Shanghai Ranking),
- **Times Higher Education World University Ranking** (THE WUR),
- **Quacquarelli Symonds World University Rankings.**

The position of a university in the rankings brings many consequences. In particular, it results in other universities being more ready to form alliances and enter into strategic cooperation. It attracts private funds and influences the decisions of public authorities. A university's position in the rankings is also one of the most important criteria when scientific employees and students, especially foreign ones, choose a university.

International students are especially receptive to rankings. A 2008 UK study found that overseas students, especially engineering students, were interested in quality rankings (Soo and Elliot, 2008, 14). Roughly one third of international students to Sweden in 2007 and 2008 used rankings as a vital source of information; this was especially true for Asian and Latin American students (HSV, 2009, 39). Similarly, Chinese, Japanese and Korean students enrolled on graduate programmes were heavily influenced by Canada's reputation for high quality education; the findings were particularly significant for engineering and business students (Chen, 2007, 771). While postgraduate students are more concerned about institutional position than undergraduate students, both rate institutional reputation as very valuable for career opportunities (i-graduate, 2010).

E. Hazelkorn, *The Effects of Rankings on Student Choices and Institutional Selection*
[in:] *Access and Expansion Post-Massification: Opportunities and Barriers to Further Growth in Higher Education Participation*, B. Jongbloed, H. Vossensteyn (eds.),
Routledge, London 2014

Leading universities enter more willingly into institutional cooperation with universities from their league. In any case, they pay attention to their partners' positions. A good example of this is a document created in the International Strategy Office at Oxford University, in which the positions of Asian universities are analysed ([link](#)).

This is why the fall in (or in any case lack of increase in) the position of the University of Warsaw in respected rankings poses a threat in many respects:

- **teaching**

The University is considered unattractive by foreign students, but also by candidates from Poland.

- **conducting research**

The University is deemed unattractive by talented scientific staff.

- **collaboration with renowned institutions**

To support science the governments of various countries are investing heavily (China, various Arab states, Russia). In addition, universities themselves are developing strategies to promote and maintain their positions. For the University of Warsaw, this means that unless it takes care of its position in rankings and unless it has a well-thought-through strategy aimed at improving those indicators, the University may get left behind.

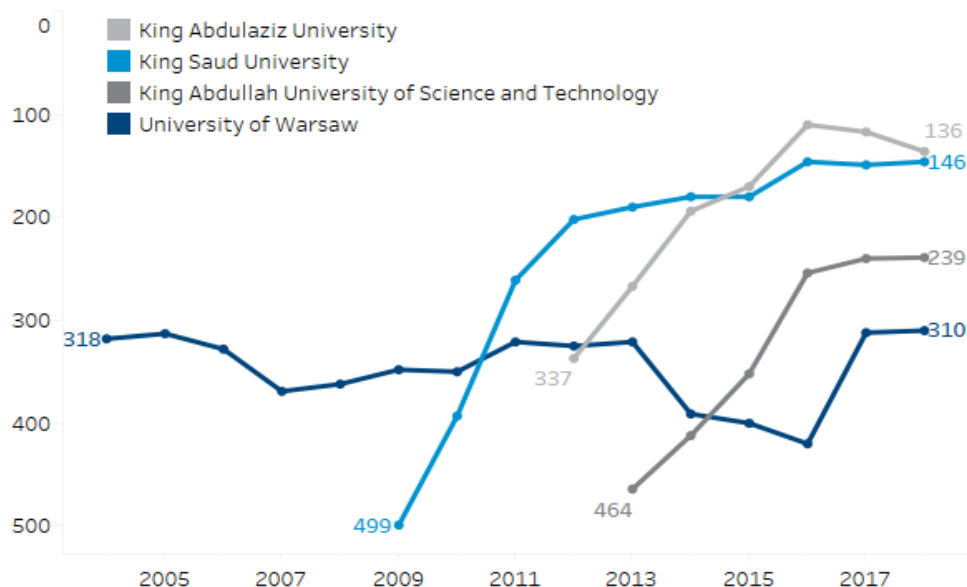
2. Outflow of employees

Globalisation has meant that the influence of a university (especially universities from the top of international rankings), and its power to attract students and employees, encompasses the whole world. In some of the highest-ranked universities, over half of the employees come from a different country ([link](#)). In the year 2015, the percentage of foreigners at British universities alone was 29%. At Harvard University, this statistic has even reached 38% ([link](#)). The most international university in the world is the American University of Sharjah in the United Arab Emirates, where foreigners make up over 80% of the academic community.

All this points to the fact that the **competitive struggle for the best employees is gaining momentum**. What counts in this confrontation is not only the reputation of a university and its position in rankings, but also the conditions it can offer to its staff (remuneration, the quality of workspaces, extra benefits in the form of social packages, help with finding attractive employment for one's life partner).

In this context, it is not surprising that affluent Arab universities place highly in those rankings, since they attract scientists (including Nobel prize winners) who have produced impressive publications. The example of universities from Saudi Arabia shows that, despite having been ranked in ARWU for a mere decade now, their growth – driven precisely by an influx of outstanding employees – is very rapid.

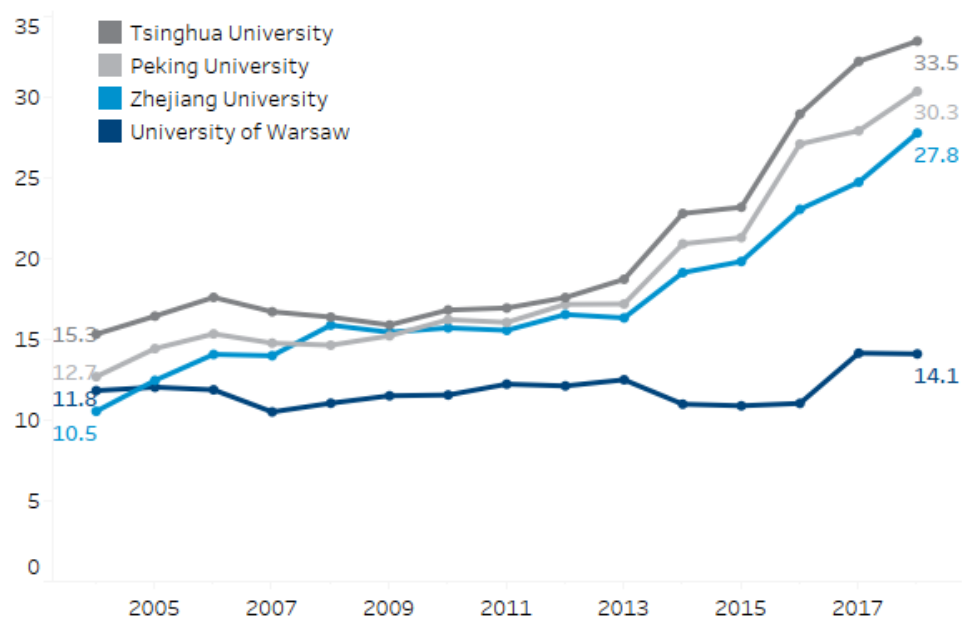
Picture 7. Place of universities from Saudi Arabia in the ARWU ranking, 2004–2018



Source: ARWU data.

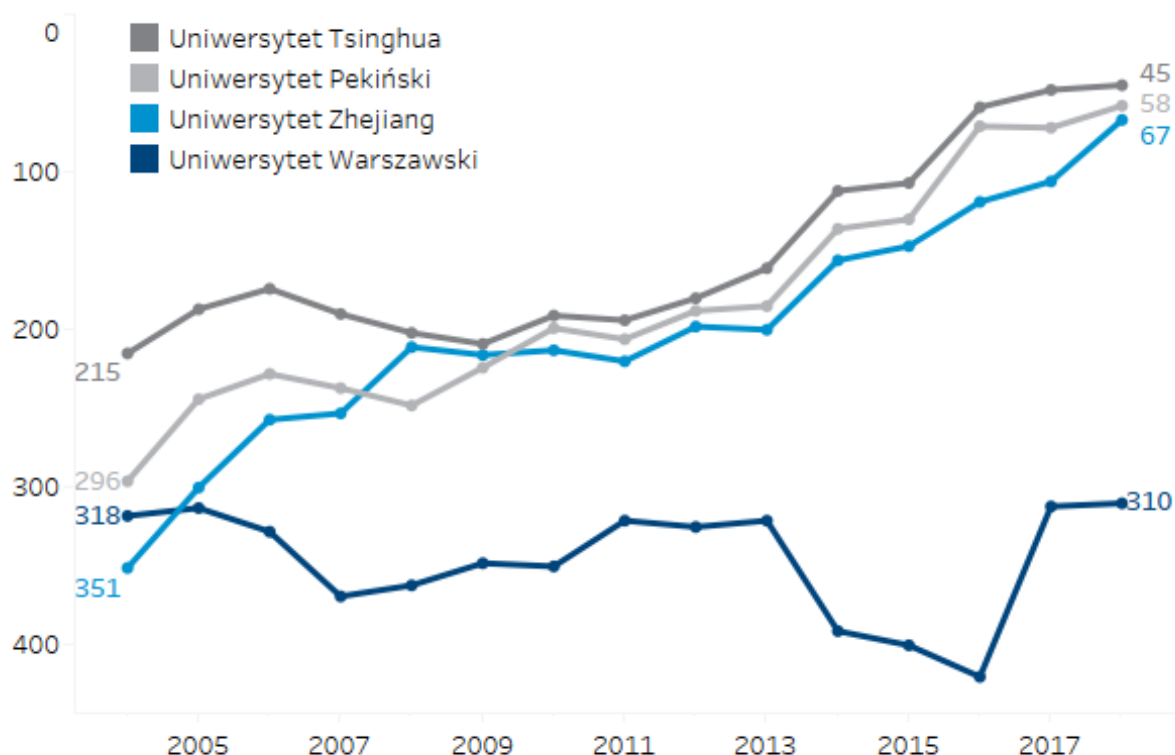
Chinese universities are also actively investing in the development of their scientific staff, which can be clearly seen by their results in the Shanghai Ranking, in particular in recent years (for their total score and position in the ranking).

Picture 8. Scoring by the University of Warsaw and Chinese universities in the ARWU ranking, 2004–2018 (total score)



Source: ARWU data.

Picture 9. Place of the University of Warsaw against the background of Chinese universities in the ARWU ranking, 2004–2018



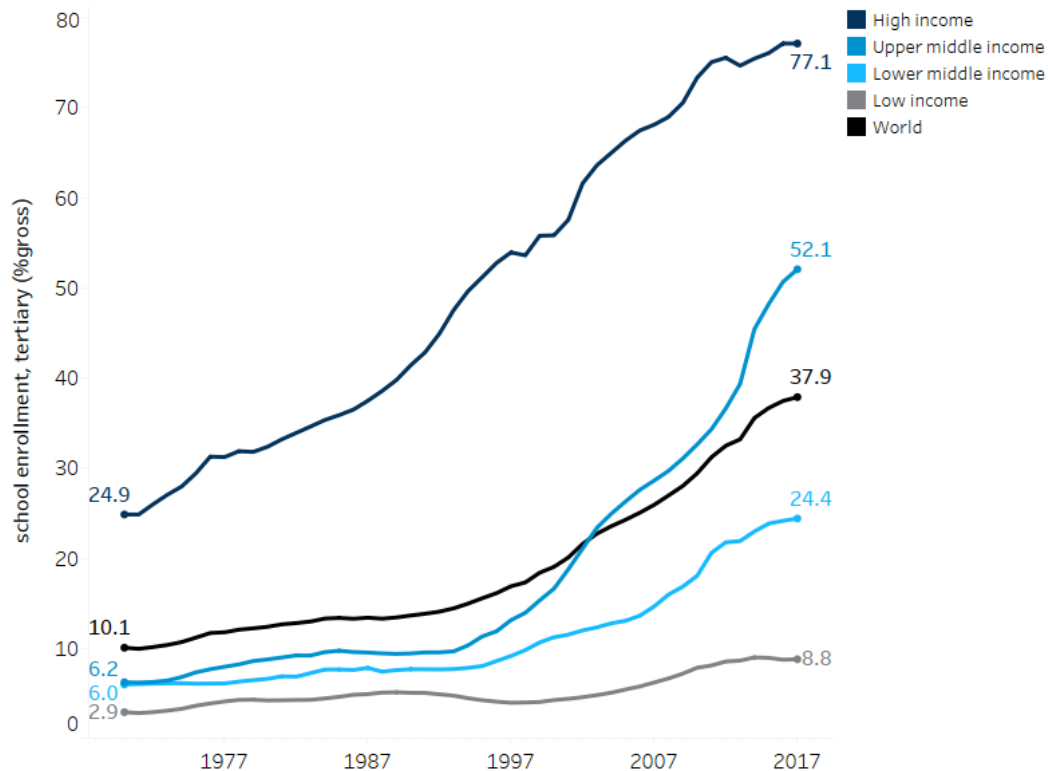
Source: ARWU data.

For the sake of comparison, the graph also includes the much lower position of the University of Warsaw, which is caused among other things by its much lower potential to compete for the best employees. Suffice to say that the level of salaries at The University of Warsaw is much lower than that at European universities (this can be clearly seen in the framework programme Horizon 2020). In addition, in many cases the work stations are relatively poor quality and the social package not very attractive. The University does not have a **strategy for attracting talent and managing it either**. It is worth stressing, however, that despite growing competition and increased mobility, Polish scientists are becoming more and more recognised and appreciated around the world.

3. Young talented Poles are attracted by Western universities

Since the beginning of the 21st century, the structure of the student population has been changing. In developed countries, particularly in Europe, their number is falling. On the other hand, the number of students from other regions of the world, almost half of whom come from India and China, is increasing rapidly.

Picture 10. Gross enrollment rate for higher education (%), 1970–2017

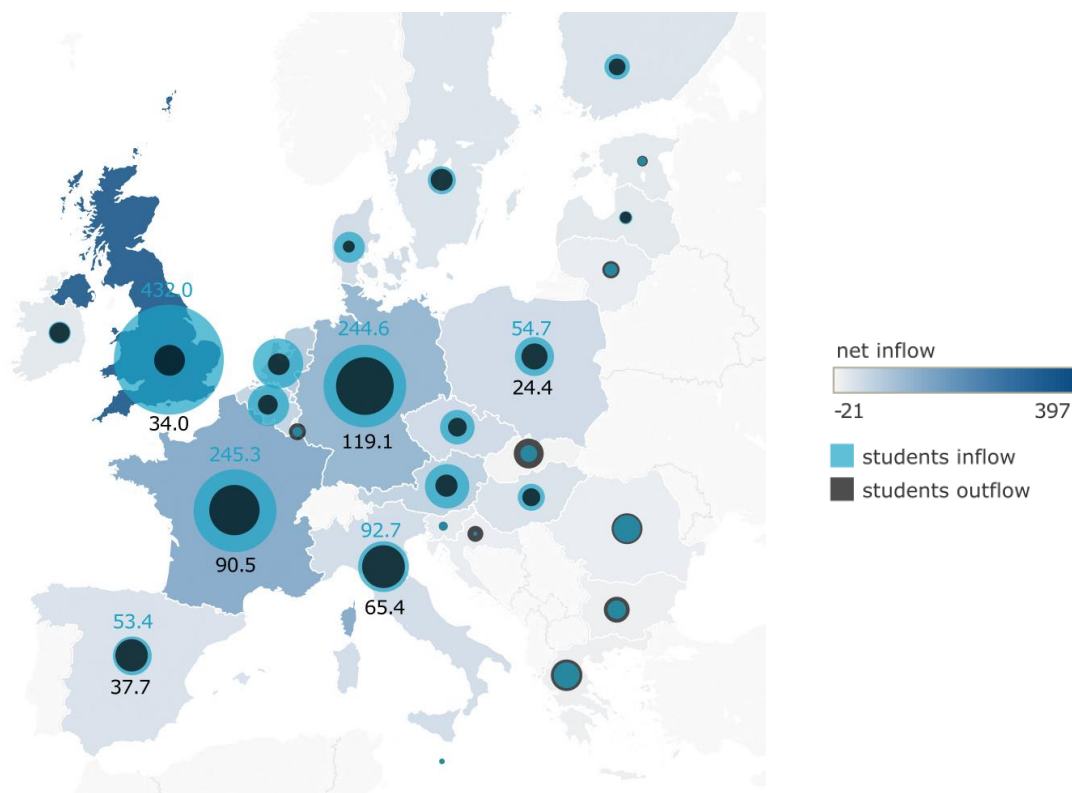


Source: World Bank Data.

In practice, this means that the **struggle for talented foreign students has increased**. Even now it can be seen that at American and European universities, there are significantly more Asian students. In the future it can be expected that educational mobility will not only remain the same but it will even increase, with students coming particularly from China.

The results of research conducted regarding Europe also confirm this trend. Western universities, particularly British, French and German ones, are the most frequently chosen places for studying, especially by students from Middle and Eastern Europe ([link](#)).

Picture 11. Inflow and outflow of students in 2017



Source: UIS-Statistics UNESCO data.

Looking at the data for Britain clearly shows how high the mobility of Polish students in recent years has reached. The inflow of young Polish people to the UK in 2017 was almost 27% higher compared to the year 2013 ([link](#)).

Table 5. Top 10 countries of origin of international students studying in the UK

	2013–2014	2014–2015	2015–2016	2016–2017
Germany	14.06	13.68	13.43	13.74
France	11.50	11.96	12.53	13.56
Italy	9.55	10.53	12.14	13.46
Ireland	11.49	10.91	10.25	10.07
Greece	10.67	10.13	9.79	10.05
Cyprus	10.30	9.75	9.33	9.15
Spain	6.59	7.04	7.84	8.82
Romania	6.52	6.59	7.20	8.11
Bulgaria	6.36	6.26	6.20	6.59
Poland	5.20	5.25	5.66	6.59

Source: UKCISA, HESA data, ([link](#)).

The situation described means Polish universities face two challenges:

- **keeping the country's own talented young people in the country**
- **starting to fight for foreign students intensively.**

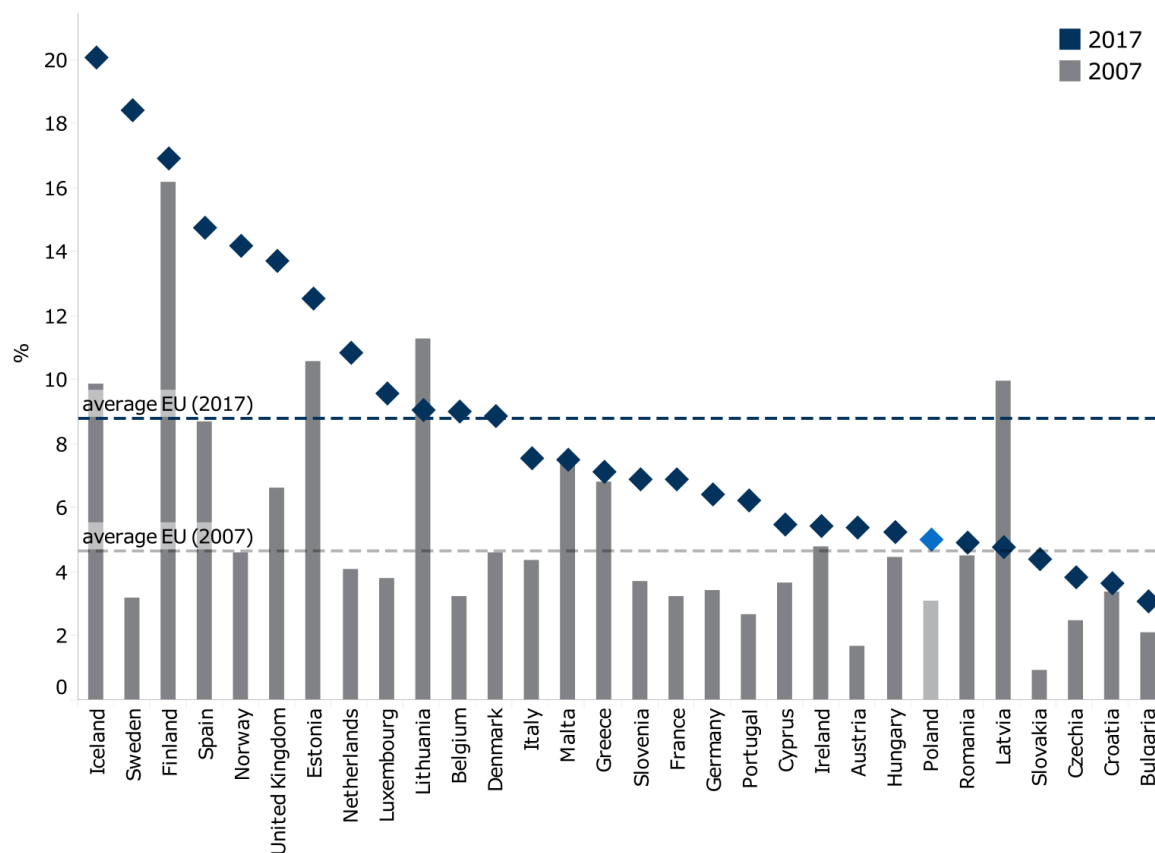
An extremely important new trend in the academic world is creating campuses outside the home country's borders (so-called *branch campuses*, [link](#)). Activities of this kind are undertaken not only by renowned Western universities, but also by relatively young institutions that come from developing countries.

Peking University's Peking HSBC Business School (PHBS) is developing a campus near Oxford in the UK. Mumbai University is actively seeking a site for a new campus in the USA. Overall 65 of the 310 international branch campuses catalogued by the Cross-Border Education Research Team (CBERT) at the State University of New York-Albany have been launched by developing country universities.

R. Garrett, K. Kinser, J.E. Lane, R. Merola, *International Branch Campuses*
– *Trends and Developments 2016*, The OBHE with SUNY, Albany & Pennsylvania State University

An important dimension of globalisation, which has been observed for some time, is the offering of massive open online courses (MOOC) by universities. An example is Open Course Ware MIT ([link](#)), as part of which the complete materials for many subjects are made accessible, or Harvard Online Learning ([link](#)). The concept enjoys great popularity and is being continually developed. For example, École polytechnique fédérale de Lausanne (EPFL, [link](#)) broadcasts lectures via the Internet and allows students to pass courses remotely. In the years 2012–2017, over two million people enrolled in courses, out of whom 100,000 got certificates of completion.

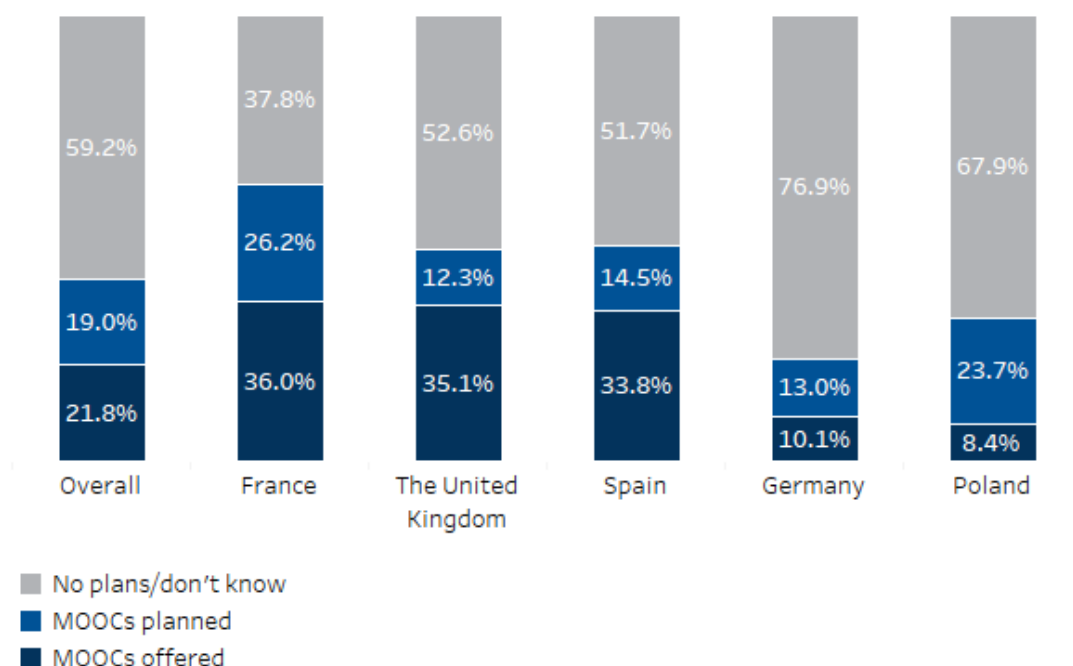
Picture 12. Percentage of people who attended an online course within the last 3 months, 2007 and 2017



Source: Eurostat DESI. *Poland: data from 2008 and 2017.

In Poland the concept of MOOC is still waiting to be developed. The percentage of courses currently offered is relatively low, though we are starting to discover their great potential too. Massive open online courses, among other things, make it possible to lower the costs of teaching, to use existing resources in a better way (“mixed training”), to offer more flexible teaching methods, to reach new groups of recipients, and thus to increase the visibility of a university and improve its self-promotion. There is a lot to suggest that if Polish universities (including the University of Warsaw) start to make such courses available, they will have to develop their own suitable and sustainable teaching models ([link](#)).

Picture 13. MOOC offer



Source: J. C. Munoz *et al.*, How are higher education institutions dealing with openness?, “JRC Science for policy report”, 2016, ([link](#)), p. 22.

The trends described prove how important it is for universities to **function within the global network**, as well as offer easy access to knowledge and educational services. This makes sense not only in terms of image and promotion, but above of all this affects the actual decisions of students regarding where they will finally acquire their higher education. There can therefore be no doubt that in order to function within a global network, a university is required to **change its teaching methods, develop new skills amongst its academic staff, build modern infrastructure and state-of-the-art IT systems.**

4. Higher costs of investment and infrastructure maintenance

The University is implementing a long-term programme, “University of Warsaw 2016–2025”, as part of which 18 investments have been planned. Since the year 2015, when the budget for those investments was prepared, costs in the building market have risen by 30-40% on average (depending on the type of investment). This applies not only to the costs of materials: an increase in fuel prices has lead in turn to an increase in the costs of renting and operating construction equipment. In addition, labour costs have gone up; in 2018 they were on average 6.5% higher than the year before. It is predicted that this trend will be maintained, which poses a real threat to the full implementation of the investment plan. As a consequence, some faculties at the University of Warsaw may have to give up the idea of improving

working conditions. A similar danger is related to the increasing costs of operating buildings and laboratory infrastructure (compare the rise in the costs of energy and other utilities in particular), which even now constitute a considerable proportion of the University's budget.

A report on inflation published in March 2019 by the Polish Monetary Policy Council assumes that the freezing of electricity prices, as carried out under the Act of 28th December 2018, only applies to the year 2019. Following the "central inflation forecast", it has thus been accepted that from 2020 onwards, electricity tariffs will be shaped in accordance with earlier mechanisms.

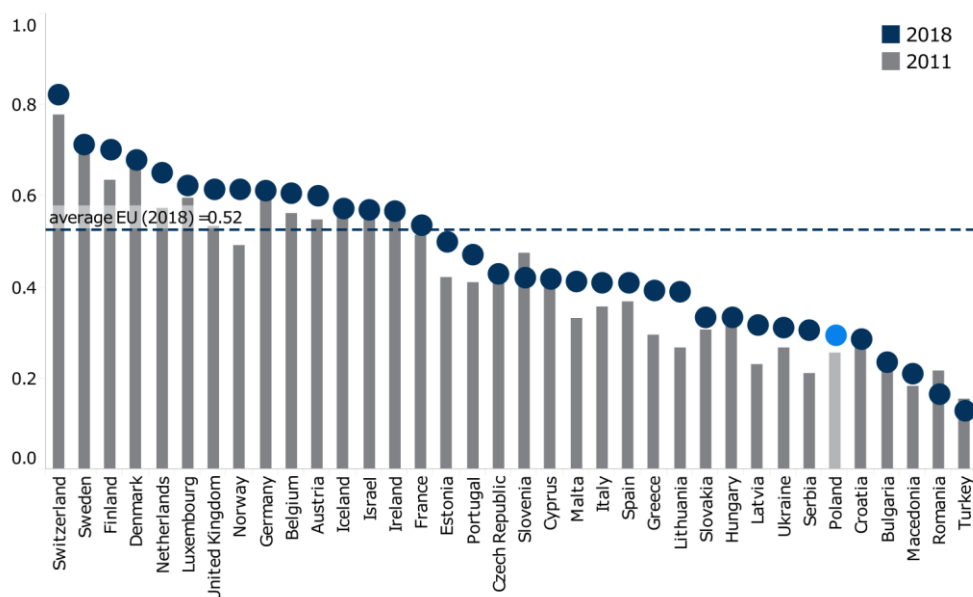
On the other hand, according to a forecast from the Institute for Renewable Energy, based on the assumptions of the project "Integrated 2030 National Energy and Climate Plan" (sent in January 2019 by the Polish Ministry of Energy to the European Commission for acceptance), the cost of generating electricity in Poland in the years 2018–2020 will have grown by almost 50% (in fixed prices, without adjusting for inflation), from 191 zł/kWh in 2017 to 274 zł/kWh in 2019 and then 283 zł/kWh in 2020.

5. Moderate innovation in Poland

Innovation is considered one of the most important factors that contribute to the competitiveness of countries and regions. According to the European Innovation Scoreboard 2018 report from the European Commission ([link](#)), Poland came 25th out of 28 EU countries. **The country was included in the group of moderate innovators**, for whom the values of the Summary Innovation Index (SII) fall between 50-90%. Poland is joined in this category by Croatia, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Portugal, Slovakia and Spain.

Poland reached the highest level of the SII in 2011, and the lowest two years later, after which the country saw another increase. The fluctuation of Poland's level in the index did not significantly influence the country's position in the ranking, usually placing it at the bottom of the scale.

Picture 14. European Commission's Summary Innovation Index, 2011 and 2018

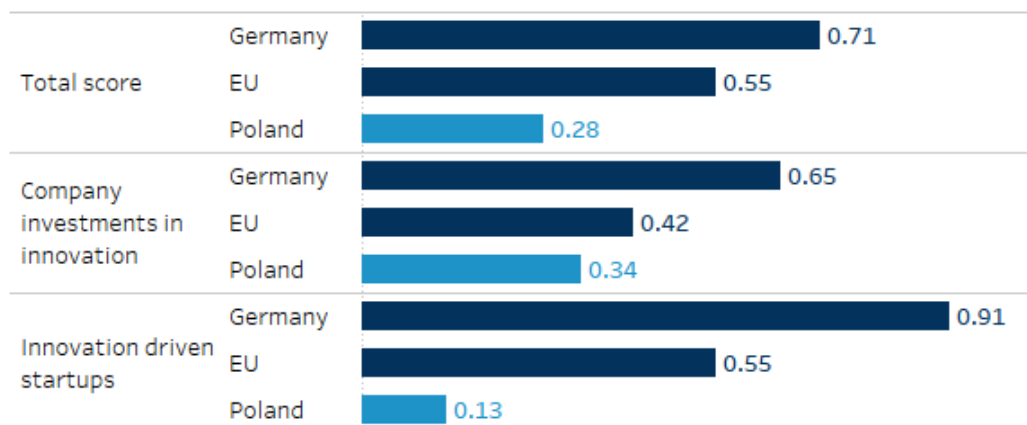


Source: European Commission data, European Innovation Scoreboard 2019.

This general situation means for the university that there is a low demand for Poland's scientific knowledge as well as limited resources for research and development. Polish industry does not invest in research and development, which might have become a source of innovation. At the same time relatively little private money flows into the scientific sector.

All this means that universities have only a **limited chance of taking part in building an economy based on knowledge**. This is a system in which knowledge is created, acquired, transferred and used more effectively by companies, organisations, physical persons and communities, which fosters the quick development of industry and society.

Picture 15. Poland lags behind the European Union in terms of innovation (Innovation Union Scoreboard, scale 0–1, 2013)



Source: W. Bogdan et al., *Poland 2025: Europe's new growth engine*, McKinsey&Company, 2015, p. 49.

In this context, the **pharmaceutical sector** stands out: in the view of specialists it has the chance of becoming an innovation hub not only for the region of Central and Eastern Europe, but also for the whole world. Even now the University of Warsaw is cooperating with pharmaceutical companies, and one ground-breaking method of increasing the durability and productivity of mRNA, developed by two scientists from the University of Warsaw – prof. Jacek Jemielity and prof. Edward Darzynkiewicz, is the greatest instance of commercialisation in the history of Polish science (it has already been licensed by two international pharmaceutical companies for an overall price of 610 million dollars). The ability to deliver innovations at the interface with medicine will surely be strengthened by federalisation with Warsaw Medical University (WUM). It will also make it possible to perform clinical trials.

The **food sector** also has great chances of development. According to McKinsey report entitled *Poland 2025: A New Engine of Growth in Europe* ([link](#)), Poland is even now the fourth largest supplier of food in Europe (200 million European citizens live within a 1000 km of Poland). In light of this, the fact that the University of Warsaw is an EIT Food centre takes on particular importance. There is no doubt that demand for research in this sector is vast.

Another consequence of low innovation in Poland is an **ecosystem, which does not cultivate the development of university spin-offs or shape entrepreneurial attitudes**. Consequently, talented innovators drift away from the University and find a different place to realise their visions.

The relatively low level of innovation in Poland is a danger to the country's further industrial development, and consequently to the amount of public subsidies allocated to the science and higher education sector.

Summary: Identifying Priority Areas based on SWOT strategic analysis

The SWOT analysis revealed a diverse and dispersed potential of the University of Warsaw in terms of science, education, and material resources. We possess numerous assets: strong scientific disciplines, unique specializations and fields of education, attractive resources, research stations in prestigious locations. We are known for our talented staff and the ability to attract the best candidates. We possess certain islands of excellence: environments, teams, and programs that work in partnership with foreign research centres and the most modern infrastructure. Our external environment is also favourable: the new government bill on higher education and science increases the autonomy of universities, reduces bureaucracy, and creates conditions for a fusion of the University of Warsaw and the Medical University of Warsaw. New programs of the Ministry of Science and Higher Education make it possible to implement and manage changes, EU cohesion policy in the region makes us desirable partners, and because of the mounting global crisis, there is a growing demand for expertise.

At the same time, however, certain fields of study are relatively weak in terms of research and teaching; there are units operating in very bad conditions and without adequate facilities, teams and centres struggling to stay within the budget, low-quality educational programs recruiting inadequate candidates, and a significant share (20–30%) of staff with low competences. The largest deficits were recorded in the organizational and management structure. Systemic mechanisms caused the atomization of universities: it is difficult to maintain common standards and the procedures are sometimes inconsistent. These weaknesses are dangerous in the context of the global competitiveness for talent, a struggle which requires organizational efficiency, material conditions, and research facilities. Infrastructure maintenance costs are also rising, which is why the ability to capitalize on the economies of scale and synergy becomes essential.

Nonetheless, the University of Warsaw has never developed an integrated research management system, its scientific facilities (laboratories, equipment) are dispersed, while their optimal use remains hindered by the silo-like organizational structure and bureaucratic barriers of the University. We lack a coherent, professionally managed system of science support; especially, there is a pressing need for competent science support staff and professional science managers. The University's faculties are highly diversified in terms of access to such services, which naturally leads to a kind of Matthew effect. Symptomatically, the department dealing with employment matters is still called Staff Affairs Department instead of Human Resources Department.

The analysis has shown that the huge potential of the University of Warsaw –documented by the achievements of scientists, the position of some fields of study, the careers of foreign scientists and graduates – **has an island-like character and is blocked by deficits in the realm of organization and management.**

The analysis has also demonstrated that a competitive strategy is the most effective way to achieve the objectives of scientific excellence. **This means harnessing strengths and opportunities to reinforce weak points and overcome risks. Therefore, the main idea in constructing Priority Research Areas, let alone defining their operational objectives and planning their activities, was to leverage, scale, and strengthen the spill over effect, to add new elements to the University's islands of excellence, the already existing strong fields of study and scientific circles, and, finally, to produce a synergic combination of resources.**

Priority research areas were determined on the basis of three identification criteria:

- research links of strong fields of study with relatively weaker ones, that enable leveraging the standards and potential of the first to provide an impulse to the second,
- multidisciplinary research issues – fundamental scientific problems and societal challenges – in which these links are required; focusing on those issues increases the chances of the scientific results obtained to gain attention and recognition,
- international teams and research communities dealing with issues in this area, that function already at the University of Warsaw, having strong working relations with the renown institutes; these teams and research communities provide a good point of departure for scaling up a given research area.

Based on these, we have identified the areas with the highest potential of achieving in the timespan of 6 years the significant increase in the visibility and impact of the University of Warsaw:

- 1) **Science for the Planet.** Integrated multidisciplinary approach to identify and address environmental threats: climate change, biodiversity, health.

Strong fields: physics, chemistry, earth sciences, linked to the relatively weaker ones (e.g. biology)

Internationalized teams and environments: Faculty of Physics, EIT Food, EIT Climate.

Priority in UN and EU agendas (Action for the Planet), and additionally will benefit from the federalization with the Warsaw Medical University

- 2) **Beyond the Micro and Macro Worlds: searching for cutting-edge innovations.** The materials, energy sources, and technologies for the future, which facilitate a balanced growth of science and economy.

Strong fields: astronomy, chemistry, physics

Internationalized teams and environments: The Centre for Quantum Optical Technologies

Priority in agenda of international organizations, governments, industry

Big potential for commercialization

- 3) **The Challenge of Petabytes.** Advanced mathematics and computer science developing analytical tools to cope with massive data – from random processes on stock exchange to medical diagnostics.

***Strong fields:** mathematics, computer science, physics, and relatively weaker, e.g. social sciences*

***Internationalized teams and environments:** Faculty of Mathematics, Computer Science and Mechanics, Digital Economy Lab*

Priority in EU and WEF agendas, high public interest

Big potential for commercialization

- 4) **The Humanities: Crossing Borders, Extending Capabilities.** The growing body of research, which crosses the borders of scientific disciplines to gain new insights into the mind, language, and culture.

***Strong fields:** philosophy, archaeology, psychology, but also relatively unique specializations, like oriental studies*

***Internationalized teams and environments:** DARIAH-PL, Artes Liberales*

Priority in EU agenda (preflagship Time Machine from digitized humanities)

- 5) **Responding to Global Challenges.** Searching for regional solutions to increased mobility, multifaceted inequalities, digital transformation in joint multidisciplinary teams.

***Strong fields:** economics, geography, political science*

***Internationalized teams and environments:** Centre for Migration Research, Institute for Social Studies*

Priority in agenda of majority of world organizations

It is worth stressing that the Priority Research Areas have been identified and worked out:

- 1) involving the team representing all disciplines, faculties and centres operating at the University, that also worked on the SWOT analysis,
- 2) planned for by these teams: each Priority Research Areas has already its scientific agenda and the road map; involvement in developing the concepts of specific Priority Research Areas has built high levels of engagement and the sense of responsibility for achieving the results declared.

In turn, the detailed operational objectives are to give a strong development impulse to the Priority Research Areas, which the University of Warsaw treats as a **driving force for a quality leap for the entire university**. The implemented instruments will create new tools and standards for supporting scientific excellence. They will also make it possible to introduce innovative organizational solutions which will spread throughout the entire university. In this way, we plan another element of the leverage strategy – to seize the opportunity created by the Excellence Initiative for organizational changes.