

# APPLICATION

## Excellence Initiative – Research University

- ABBREVIATED VERSION -

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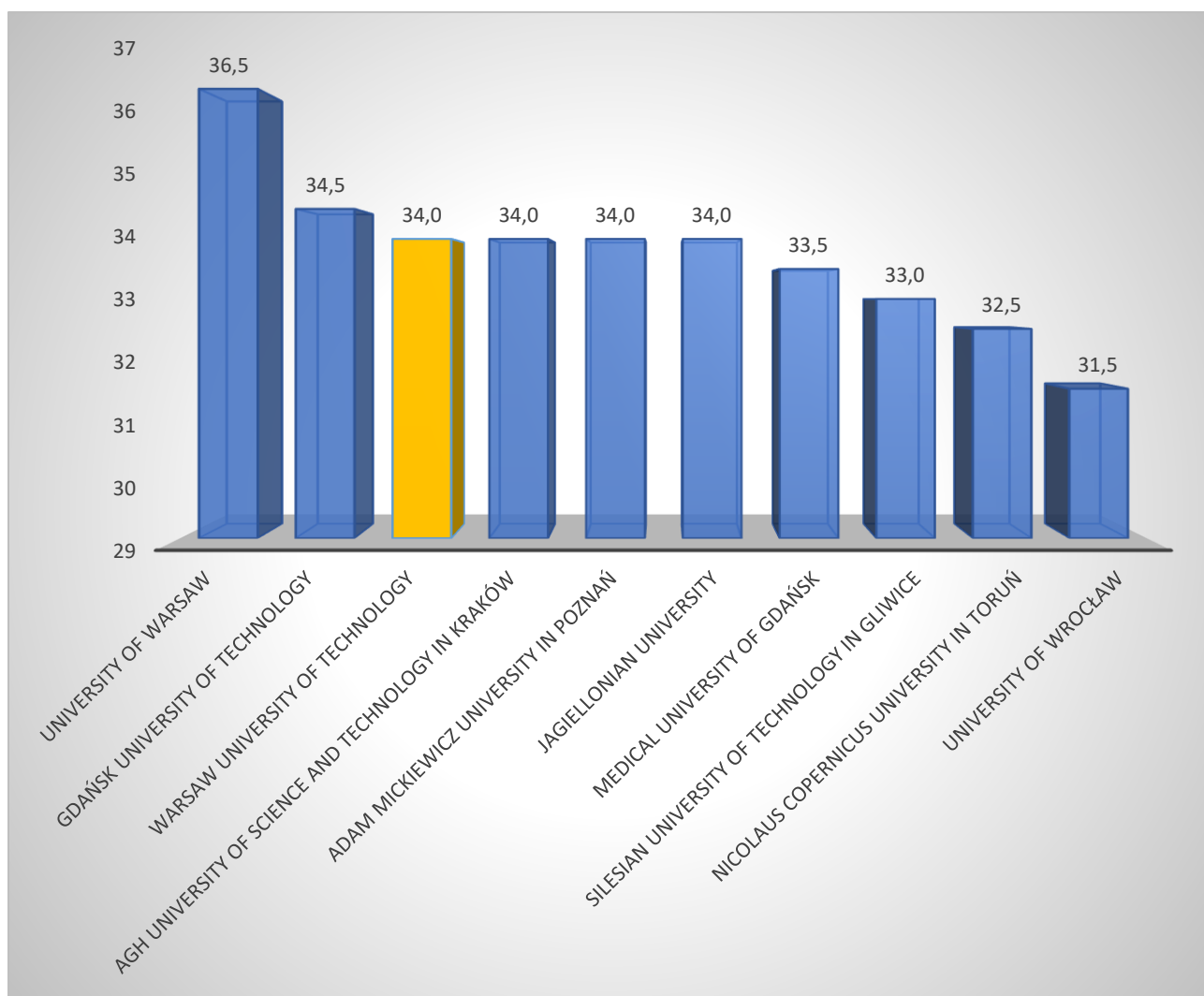
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## 1. GENERAL INFORMATION

The idea behind the Excellence Initiative – Research University Programme was to select the best Polish universities and provide them with an opportunity to grow so that, in the future, they can be ranked among renowned universities all over the world that provide high quality studies and education.

Out of all universities in Poland, the top 20 qualified for the first competition “Excellence Initiative – Research University” organised by the Ministry of Science and Higher Education (MSHE). During the next stage, they were evaluated by an international team of 15 prominent experts from the science and higher education sector. The experts selected 10 universities that will become research universities. In that group, the Warsaw University of Technology (WUT) was ranked number three (along with three other universities):

University name	Score
1. University of Warsaw	36,5
2. Gdańsk University of Technology	34,5
3. Warsaw University of Technology	34,0
3. AGH University of Science and Technology in Kraków	34,0
3. Adam Mickiewicz University in Poznań	34,0
3. Jagiellonian University	34,0
7. Medical University of Gdańsk	33,5
8. Silesian University of Technology in Gliwice	33,0
9. Nicolaus Copernicus University in Toruń	32,5
10. University of Wrocław	31,5



The beneficiaries selected as part of the programme will receive an extra 10% on top of the regular subsidy in 2020 to 2026. To prepare for the university's participation in Excellence Initiative – Research University Programme, a special team was established at the Warsaw University of Technology; the team was responsible for the formulation of the objectives and tasks and for the preparation of the application for the Ministry of Science and Higher Education.

As part of the preparations for the participation in the Excellence Initiative – Research University Programme the WUT Team needed to prepare a comprehensive application which comprised 10 thematic sections. The most important sections which required very solid preparation and elaboration of data included the objectives and a time sheet of activities developed in accordance with the guidelines of the Ministry of Science and Higher Education.

As regards the improvement of the quality of the research activity and the quality of education so as to improve the academic prestige of the university on the international arena, the universities were asked to elaborate on the five main objectives that would involve:

- 1) increasing the impact of the university's scientific activity on the development of global science, especially in the priority research areas that have high growth potential, in

which the university intends to intensify its scientific activity, hereinafter referred to as the “priority research areas”;

- 2) strengthening research collaboration with academic institutions of high reputation at the international level, especially in the priority research areas;
- 3) improving the quality of education of undergraduate and doctoral students, especially in specialties and academic disciplines related to the priority research areas, while accounting for the need to include undergrad students and doctoral students in academic research programmes and the need to compete effectively for the most talented candidates for undergrad and PhD programmes, including candidates from other countries, and the need for talent management;
- 4) developing and implementing comprehensive solutions for professional development of university employees, including in particular young researchers;
- 5) improving the quality of the university management, including organisational changes that will promote quality improvement.

## **2. KEY INFORMATION CONTAINED IN THE APPLICATION**

### **2.1 Priority research areas**

- 1) Photonic Technologies
- 2) Artificial Intelligence and Robotics
- 3) Cybersecurity and Data Science
- 4) Biotechnology and Biomedical Engineering
- 5) Materials Technologies
- 6) High Energy Physics and Experimental Techniques
- 7) Energy Conversion and Storage

### **2.2 Objectives for improving quality of research and education**

2.2.1 Specific objectives for increasing the impact of the university’s research activity on the development of world science, especially in priority research areas with high development potential, in which the university plans to intensify its research activity.

- a) Integration of research within priority research areas.

WUT Priority Research Areas (POBs) have been selected taking into account high potential of academic staff, with a particular focus on strong teams of young researchers with an impressive publication record and significant project achievements. Other selection criteria included advanced research infrastructure and compatibility with global research trends. Research within each POB will be carried out by the teams from various University organisational units. In order to foster research development

in these areas and ensure its high quality, integration of research combined with considerable additional financial support from the University budget is required. Therefore, interdisciplinary research centres related to POBs will be established. These centres will receive significant funds, depending on their specificity and needs.

- b) The increased research activity of the University's academics and doctoral students.

The research activity of various teams in various subject areas is diversified both in terms of the count and quality of publications and in terms of completed projects. In order to improve the quality of research activity, it is necessary, before most, to introduce clear and consistent regulations on periodical employee appraisal. The concentration of research activity and improvement of its quality will be facilitated by internal grant programmes, aimed primarily at young promising academics. These programmes will encourage them to initiate high-risk projects of great originality (the so-called seed grants). It is also planned to introduce quality-oriented grants for doctoral candidates

- c) Increasing the count of publications in prestigious journals and their citation index, especially in priority research areas.

WUT academic staff and doctoral candidates are highly active in publishing in international journals, which makes the University exceptional in comparison to other research units in Poland. The field-weighted citation factor for most academic disciplines stands at the world average level. At the same time, a significant number of WUT publications are among 10% of the most highly cited publications in the world. In order to additionally encourage WUT staff to publish in the most prestigious journals, the programme Best Paper will be launched, which year by year will reward the authors of the best publications. A relatively low percentage of WUT publications is available in Open Access resources, which decreases their accessibility and makes it difficult to disseminate research results. In order to improve the situation, the University programme Open Science will be established to support publication in open access in line with European Union science policy.

- d) Fostering innovation and technology transfer mechanisms.

WUT is a top Polish university in the field of applied research resulting in patents and innovations. The funds obtained through commercialisation of knowledge are becoming an increasingly significant component of financing further research and development work. However, the University's efficiency in this field should be significantly improved (W.1.8) and appropriate incentive actions need to be taken in this area. Therefore, Innovative WUT programme will be launched aimed at strengthening the University's innovativeness, and consisting of two key components, focused on inspiring and financing patents, primarily international ones (Patent WUT) and supporting innovative researchers (WUT's Best Innovators). Knowledge can also be transferred from the University to the environment through spin-off and spin-out companies, so additionally, WUT Accelerator programme, supporting establishment and development of such companies will be introduced, making use of entrepreneurial attitudes of students, graduates and research staff.

- e) Increasing WUT's participation in research grant programmes, especially international EU programmes

The funding system of a research university must rely to a large degree on external research grants. It is vital to participate in international consortia that complete projects within EU framework programmes. WUT is also determined to win prestigious ERC grants. The use of these grants has a considerable impact on the University's international standing. Due to an identified small number of international projects and insufficient support for international project management (W.4.2), comprehensive actions will be taken, including establishment of a professional office which will support applicants for international projects, a programme of internal grants to support grant applications, in particular ERC grants and adjustment of the remuneration scheme so that it motivates academics to apply for international projects.

#### 2.2.2 Specific objectives for enhancing research collaboration with research institutions of high international reputation, especially in priority research areas.

- a) Strengthening WUT's integration with top European HEIs.

The Warsaw University of Technology recognizes the necessity to join the European programmes that integrate research and higher education. WUT's participation in these Initiatives will stimulate the development of POBs and increase the level of internationalisation of academics. WUT's participation in a consortium of HEIs established within the European Universities programme will play a key role in the intensification of international collaboration, both in the area of education and in the area of research. The objective of this initiative is to improve the strategic partnership of European HEIs and to increase their global competitiveness. Participation in this programme is a strategic aim of the Warsaw University of Technology. To this end, WUT has already signed a memorandum with the Technical University of Berlin on joint action towards establishing the consortium. Its creation will enable an essential change in our relations with European HEIs.

- b) Increased international research exchange.

International collaboration is a key to research excellence. Our analyses have shown that publications coauthored by WUT academics and researchers from the scientific centres abroad have higher citation counts than publications with exclusively Polish authors. Unfortunately, the level of research internationalisation at WUT is insufficient as only circa 30% of WUT's publications were co-authored by foreign academics. This is caused, among others, by low mobility of research staff and doctoral students, especially in some research areas. It is thus necessary to intensify collaboration with international teams, especially from institutions of high international reputation. This will be achieved through a programme addressed to academics and doctoral students, fostering research visits and stays at prestigious academic centres.

For a research university, equally important are students, doctoral students and academics incoming to WUT from prestigious scientific institutions. WUT may offer international students and experts well-equipped research and teaching laboratories. The University is planning actions to encourage foreign doctoral candidates and experts to visit WUT, such as a new attractive grant programme for foreign doctoral students, post-doctoral interns and visiting professors. We also plan to intensively use the

existing funding schemes for financing this exchange in the form of grants offered by the Polish National Agency for Academic Exchange (NAWA).

c) Improvement of WUT's international recognisability

WUT is a top university among Polish HEIs rated in international rankings, especially in the University's key research areas. Improvement of WUT's position in international rankings require not only improvement of the research activity of the University (scientific publications constitute circa 50%-60% of weight in the rankings, directly or indirectly), but also strengthening WUT's reputation abroad. The University's recognisability also requires a number of actions both at the level of WUT authorities (joining the European University programme, strengthening the level of promotion of research and innovation achievements), as well as the participation of academic staff in shaping WUT's international brand (WUT's International Brand programme). On top of that, WUT will support its academics in their activity in international scientific associations and research networks.

2.2.3 Specific objectives for improving quality of education provision for students and doctoral training, especially in fields of study and disciplines of science related to priority research areas, taking into account the need to include students and doctoral candidates in research activities and the need to compete effectively for the most talented applicants, including foreign ones, to study programmes and to doctoral schools. The objectives should also take into account implementation of a talent management system.

a) Adjustment of the education system to the model typical for a research university

Adjustment of the education system at WUT to the model typical for top world research universities means, inter alia, the necessity to change the proportions of students pursuing first-cycle and second-cycle degree programmes. With its position and prestige, WUT should increase the number of second-cycle students by admitting graduates of first-cycle programmes from other HEIs, including graduates of foreign HEIs to programmes taught in English. Attracting good applicants to degree programmes will be facilitated by continuing efforts aimed at modernising the educational offer (fields of study, specialisations) with particular attention paid to the areas related to POBs. Evolution of the WUT's education model involves also the shaping of modern competence profile of the graduates. The University should focus on preparing them for teamwork and searching for solutions to complex interdisciplinary problems, which requires specific research skills. It should also, to an even greater extent, stimulate their innovative and entrepreneurial attitudes and community engagement (O.10). This is not to be achieved by traditional methods of teaching. It is indispensable to commonly use innovative methods, including project-based teaching and learning, and to correlate subjects of students' projects with research. This will be supported by new learning environments exploiting ICT. WUT's objective is to increase the number of exceptionally gifted students, especially in fields of study related to POBs. For many years, the University has taken actions towards identifying and attracting such students. However, taking into consideration competition of other HEIs, we have to do more. We will offer our outstanding students comprehensive individual supervision, the opportunity to follow specially designed study programmes with extended research components and to be involved in research projects at an early stage of their degree programmes. These special provisions will draw on the experience and successes achieved by WUT's student research groups.



b) Increasing the level of internationalisation of education

In order to increase the level of internationalization of education, WUT needs international accreditations. This pertains mainly to degree programmes in English as the language of instruction and the fields of study related to POBs. This, combined with such factors as further increase in the number of degree programmes offered in English, introduction (in second-cycle degree programmes, and eventually in first-cycle degree programmes, as well) of the requirement of completing a certain number of courses taught in English and incentives to writing diploma theses in English, will facilitate international academic exchange and, in particular, encourage foreign academic staff to be part of the education process at WUT.

c) Enhancement of the quality of doctoral education

Considering WUT's achievements in doctoral education and the importance of doctoral candidates for WUT's development, in contrast to most Polish universities, we are planning to maintain the current numbers of doctoral candidates by creating a special grant fund to complement the subsidy the University receives. A sufficient „critical mass” of doctoral candidates will allow us to create educational pathways related to POBs in doctoral schools.

In order to efficiently compete in attracting applicants, especially international ones who take up research within POBs, we will make efficient use of the opportunities available at the national and international level and we will also establish our own grant programmes for „visiting professors” and international doctoral students, as well as a programme supporting joint doctorates. Doctoral candidates will be supported in achieving scientific excellence through the „Researcher's Workshop”, a system of course modules, taught in Polish and English, which shape universal research competences related to research methodology, presentation of research results (taking advantage of the Open Science), applying for research funds etc., which will be incorporated by doctoral candidates in their individual educational programmes. The efficiency of talent management within POBs will be increased by development and implementation of a talent management system. This comprehensive system, which will enable fast identification of exceptionally gifted doctoral candidates, planning and implementing their development paths in the course of education in a doctoral school and upon graduation, in connection with WUT's potential, will significantly contribute to increasing WUT's competitiveness in attracting the most talented applicants to doctoral schools from home and abroad.

2.2.4 [Specific objectives for devising and implementing comprehensive solutions for the professional development of the university's staff, especially young scientists, in the meaning of Article 360\(2\) of the Law of 20 July 2018 on Higher Education and Science.](#)

a) Enhancing staff competences in terms of providing scientific supervision, innovative teaching and effective management

Warsaw University of Technology's enormous staff potential must be reflected in both the scientific activities and teaching process. It is crucial to devote considerable attention to talented young scientists and doctoral candidates (W.3.5). Both groups have indicated insufficient supervision on the part of senior staff as one of the barriers to their development. Therefore, the University plans to

introduce a number of actions aimed at identifying and promoting best mentoring practices. These practices will be discussed during cyclical workshops devoted to analysing experiences in the mentor-mentee relationship. The planned actions will support both the less experienced persons and constitute the best method of professional development for the more senior members of staff as an integral part of the successful practical implementation of lifelong learning. This will also allow the teaching process to be perceived not only as a way of disseminating knowledge and skills but also as an opportunity for exchanging experiences (the so-called mutual mentoring, intermentoring). The existing teaching facilities should be used to provide innovative, rather than traditional teaching approaches. The ability to conduct research-based classes should become one of the core competences of academic teachers. This entails the need to involve students and doctoral candidates in problem-solving learning. Dedicated training programmes will be held in order to enable the academic staff to increase their competences in this field. These programmes will be based on the assumption that the challenge we are facing nowadays involves oversupply of information rather than its deficit. Hence, our approach to education as yet based on knowledge dissemination must change. The academic teacher should treat students and doctoral candidates as partners in the mutual search for truth, awaken their research passion and encourage them to set and solve scientific problems. Despite the rich offer of courses and training programmes, the insufficient level of specific competences is observed. Thus, special training system will be developed. It will focus on improving foreign language skills and management competences of managerial staff, particularly those managing research projects (especially international projects).

b) Making academic careers more attractive

Appropriate remuneration system, as well as prospects for professional development based on transparent criteria will help to increase the motivation of academic staff working at a research university. This should be accompanied by a system of interim assessment, which monitor the fulfilment of duties by employees on the one hand and precisely define requirements imposed on academic staff on the other. The existing WUT regulations are not optimal, but they are being improved and WUT authorities intend to improve them further. In particular, remuneration regulations, employment rules for academic staff and a modified system of interim evaluations are being developed. Among other things, the criteria for evaluating research activities will be defined by scientific boards for each scientific discipline. WUT also plans to create mechanisms linking the result of an assessment with salary levels, staff promotions and the scope of responsibilities (e.g. the teaching duties). We are implementing the outcomes of the study related to the WUT's application for the HR Excellence in Research conducted in 2018.

2.2.5 Specific objectives for improving quality of university governance and management, including quality enhancing organisational changes.

a) Strategic and organisational transformation in order to assist Excellence Strategy/ POBs

The effective transformation of Warsaw University of Technology into a research university with a focus on high-quality scientific results in POBs requires a significant organisational change. This is encouraged by the pro-reform attitude of WUT authorities (S.4.1) and a systematic raising of requirements for staff. However, it will be necessary to redirect the University's strategy towards scientific research and also to develop effective mechanisms of coordination and monitoring quality

enhancement activities. Global strategic goals will be transformed into a hierarchical set of goals clearly associated with measurable indicators, which will cover the majority of WUT units and their staff. This important change will directly affect many areas of the University's culture. Therefore a special effort must go into meticulous preparation as well as into controlling risks related to selective interpretations of the newly-established rules. A clear statement of objectives, careful task assignment and specific monitoring procedures will provide the foundations for the University's joint efforts to achieve strategic goals, in line with the idea of "what you measure is what you get".

The support of the dynamic development within POBs will also require changes in the organisational structure with an increased focus on improving management flexibility and efficiency (W.4.4). It should be noted that to achieve high standards in managing the large and variable organisation will require a significant improvement of management competences among managerial staff.

b) Improving the effectiveness and efficiency of administrative processes

The study conducted among WUT staff members clearly indicates that the complexity of administrative procedures is a widely recognised problem. It is therefore pertinent to identify and significantly reduce the procedures that take up employees' time. Special attention must be given to the support of research teams working on international research projects within POBs. Complex monitoring and regular reviewing of the effectiveness of administrative support will allow reducing risks related to the variability of the legal and financial environments.

The University must be prepared to adjust its internal administrative procedures to address research challenges. It is therefore important to develop new, flexible administrative structures that will provide a swift service for the most heavily burdened research units. With respect to these changes, a priority will be given to the development of IT solutions aimed at supporting the University's management. This will be implemented through, among other things, further development of the electronic document flow system built on top of the well-functioning WUT IT system.

## 2.3 Schedule for the implementation of the plan and description of actions aimed at achieving the objectives, planned for 2020–2025

### (1) Network of POB Research Centres

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Costs: 120 000 000,00 | Duration: 1 - 72 months

A Network of Priority Research Areas (priorytetowy obszar badawczy - POB Research Centres will be established. These will be WUT's organisational units with precisely defined tasks and significant autonomy. In the University structure, the Centres will be independent units, under direct authority of the Vice-Rector for Research. Establishment of the Centres as a tool of integrating the community around well-defined research objectives should lead to a rise in the number of research projects realized within POB, in the number and significance of publications related to them, as well as in an increase in staff potential, especially a greater number of doctoral students who carry out research within a particular POB.

#### Assumptions:

- Each Centre will have its Scientific Council, which will define its scientific and development strategy and decide on the allocation of the budget annually granted by the Rector. The Centre's Scientific Council may not comprise only WUT academics; it is advisable to invite foreign experts to join the Council.
- The Centres Network will have its own Administration Office, which will provide support in the process of grants' application, their implementation and reporting, as well as financial services.
- Due to the specificity of POBs, each Centre will draw up its own development strategy and regulations. The academic authorities, upon consultation with the Centres' Scientific Councils, will develop collaboration rules of the Centres with the Scientific Councils of Scientific Disciplines and WUT Doctoral Schools. Criteria of assessment of the Centre's activity will also be developed, which will be the basis of determination of the level of their funding in subsequent years.
- *Milestones (M=month):*
  - (a) *Establishment of the Centres: M4,*
  - (b) *Development of the Organisational Regulations of the Centres: M4,*
  - (c) *Appointment of the Scientific Council: M6,*
  - (d) *Elaboration of the Development Strategy: M10.*

## (2) Best Paper Programme to award the authors of the best publications every year

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Costs: 4 500 000,00 | Duration: 1 - 72 months

The action will directly contribute to increasing the number of publications in prestigious journals.

#### Assumptions:

- Each year, the authors of the best publications will be awarded.
- To enter the competition, one will be required to correctly affiliate the institution (Warsaw University of Technology) and submit the publication to the WUT Knowledge Base.
- Annually, the 50 best publications will receive the amount of PLN 15.000 each (to be shared by WUT-based co-authors). Detailed competition regulations will be drawn up by a Committee appointed by the Rector. It is planned to allocate a specific number of awards to each POB (two awards per POB) and academic disciplines not represented within POB.
- *Milestones (M=month):*
  - (a) *Appointment by the WUT Rector of the Committee of the Best Paper Programme: M2,*
  - (b) *Development of the competition regulations: M3,*
  - (c) *Conclusion of the 1st competition: M12,*
  - (d) *Conclusion of the 2nd competition: M24,*
  - (e) *Conclusion of the 3rd competition: M36,*
  - (f) *Conclusion of the 4th competition: M48,*
  - (g) *Conclusion of the 5th competition: M60,*
  - (h) *Conclusion of the 6th competition: M72.*

### (3) Open Science programme facilitating open access publishing

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Costs: 3 000 000,00 | Duration: 1 - 72 months

One of the ways to increase the citation index is publishing in open access. Such publications are easily accessible for a wide range of readers.

Assumptions:

- The Open Science Fund will be established to support publishing in open access.
- The Fund will cover costs of circa 100 open science publications per year.
- To make use of the fund, authors will be required to publish in a TOP 10% journal.
- Detailed regulations will be developed by a committee appointed by the Rector. The allocation of funds is planned for POBs (10 publications each) and for scientific disciplines not represented in POB.
- Assuming the cost of open science publications at circa PLN 5.000 and 100 publications to be given the support, the cost of the action is estimated at PLN 500.000 annually.
- *Milestones (M=month):*
  - (a) *Development of the regulations on fund participation: M3.*

### (4) Innovative WUT Programme

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Costs: 15 000 000,00 | Duration: 1 - 72 months

The programme Innovative WUT will develop and implement a novel policy for innovation management, which will widely support WUT staff who come up with highly innovative solutions.

Assumptions:

- The programme is based on full professionalisation of administrative services, popularisation of practical knowledge of innovation management, initiation and main tenance of contacts with business partners (including project contracts), stimulation of innovative activities, and increasing the efficiency (and the scope) of protection of WUT's know-how.
- Key elements of the programme are the projects WUT Patent and WUT Best Innovators.
- WUT Patent is a comprehensive programme that facilitates and financially supports international patent activity, which covers, the introduction of an expert system of management and valuation of intellectual property, assessment of patent potential and financing the process of obtaining and maintaining international patents.
- WUT Best Innovators is a programme of study visits at the best international centres with considerable experience in widely understood innovation and technology transfer management. The main aim is to increase the qualifications of its beneficiaries in terms of collaboration with the business, commercialisation of results and organisation of the University's own business ventures (spin-off, spin-out). The total cost of the action includes: development and implementation of a novel policy for innovation management; trainings and workshops on innovation management, patent applications, knowledge transfer, lectures

given by foreign experts, etc.; participation in industrial conferences and fairs both international and national; advertising materials; organization and maintenance of the R&D Club; University think tank for innovation management; Rector's prizes for commercialisations, successes in fairs and exhibitions; International media campaigns; international patents (min. 5 per year).

- *Milestones (M=month):*
  - (a) *Elaboration of procedures and formal documents: M6,*
  - (b) *Launch of the project WUT Patent: M6,*
  - (c) *Launch of the project WUT Best Innovators: M6,*
  - (d) *First international patent application financed from WUT Patent project: M12,*
  - (e) *First study visit within WUT Best Innovators project: M12,*
  - (f) *All mechanisms of WUT Patent and WUT Best Innovators programmes verified and efficient: M24,*
  - (g) *Verification of action's indicators: M36,*
  - (h) *All action's indicators achieved: M72.*

## (5) WUT Accelerator Programme - establishment of an accelerator fund for spin-offs

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Costs: 18 000 000,00 | Duration: 1 - 72 months

WUT Accelerator is an action aiming at facilitating initiation, incubation and acceleration of start-ups established through research activities of academics and students, functioning in its environment in the form of spin-off or spin-out.

### Assumptions:

- The action will shape attitudes of active commercialisation through direct support of incubation processes of innovative business ventures, i.e., providing legal and accounting services, introduction of mechanisms of financing one's own contribution, including capital entries and exits in case of spin-off etc.
- The action will be realised through a commercialization department or special purpose company of the University and the assumed final objective is establishment of an ecosystem of innovative companies (supported by WUT), which do business and R&D activities within the University's priority research areas.
- It is envisaged that the WUT Accelerator programme will bring about a rapid increase, in the number of spin-offs/spin-outs, the number of domestic and international patents and licences granted, in the participation in research projects funded from non-public WUT Accelerator sources (or public sources dedicated to Programme - innovative enterprises) and foster establishment of an collaboration with the University's wider accelerator fund domestic and international business for spin-offs environment.
- The total cost of the action comprises: costs of development of procedures and formal documents; purchase of expert opinions (e.g. patent landscape research, market analyses - valuations, commercialisation strategies, offers, investment process management); remuneration of the investment team and committee (external and internal experts); funding 10 projects per year (on average); financial support for spin-offs/spin-outs; own contribution needed to receive additional funds within actions such as PRF, KE or collaboration with VC funds; own contribution needed for capital entries and exits in case of spin-off.

- *Milestones (M=month):*
  - (a) *Development of procedures and formal documents (regulations, contracts, tenders, etc.): M6,*
  - (b) *Launch of the incubation/accelerator fund: M6,*
  - (c) *Beginning of the selection of teams for the WUT Accelerator programme (continuous selection): M9,*
  - (d) *The first company in the incubator: M12,*
  - (e) *Implemented and verified system of incubation and acceleration mechanisms (fully operational accelerator): M24,*
  - (f) *Verification of actions indicators: M36,*
  - (g) *All actions indicators achieved: M72.*

## **(6) Establishment of support mechanisms for applicants for International projects**

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Costs: 3 000 000,00 | Duration: 1 - 72 months

Within this action, it is planned to reinforce the staff of the International Project Department in the Centre for Project Management so that it can provide applicants for international grants with better assistance both in the task of preparing their applications (including content-related aspects) and project implementation.

Assumptions:

- This will significantly enhance the quality of the applications submitted and, consequently, improve the success rate.
- The total cost of the action comprises 4 full-time positions, 120,000 PLN per year each. Additionally, the remuneration system will be modified to encourage academics to apply for international projects. This part of the action does not require any additional funds.
- *Milestones (M=month):*
  - (a) *Recruitment of 4 employees: M12.*

## **(7) Programme of Rector's Grants to support application for external funds**

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Costs: 3 000 000,00 | Duration: 1 - 72 months

It will be a competition-based programme and to settle the grant, participants will be required to submit a proposal in a selected call. Applications to European programmes will be preferred, especially those to be submitted to the European Research Council and the European Innovation Council.

Assumptions:

- It is planned to award 20 such grants per year to the amount of PLN 25.000.
- *Milestones (M=month):*
  - (a) *Development of the competition regulations: M3,*
  - (b) *Conclusion of the 1st competition: M12,*
  - (c) *Conclusion of the 2nd competition: M24,*

- (d) Conclusion of the 3rd competition: M36,
- (e) Conclusion of the 4th competition: M48,
- (f) Conclusion of the 5th competition: M60.

## (8) European Universities Initiative Programme

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Costs: 10 000,00 | Duration: 1 - 72 months

This action aims at establishing a consortium to participate in the competition European Universities Initiative. The action will be based on strategic collaboration with Berlin University of Technology. Increased promotional activity with potential partners as well as support for both international collaboration and research and teaching projects conducted with these potential partners will be of prime importance.

Assumptions:

- Participation in the European Universities Initiative will improve WUT's recognisability and prestige, stimulate development of priority research areas and, owing to increased joint research activity, raise the level of internationalisation. Indirectly, it will also affect WUT's publishing activity.
- Being a priority for the University, this action will be funded from the University's own resources.
- *Milestones (M=month):*
  - (a) Conclusion of agreements with partners from the European Universities Initiative: M6,
  - (b) Submission of the application European Universities Initiative: M12.

## (9) Programme of research stays in prestigious centres abroad for academics and doctoral candidates

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Costs: 6 000 000,00 | Duration: 1 - 72 months

A stay in prestigious foreign centres will facilitate scientific development of academics and doctoral students. Implementation of the programme will enhance international scientific exchange, as well as increase the number of WUT's publications in International collaboration. Such publications have a higher citation index and improve the University's international recognisability.

Initiation of collaboration with international partners, especially from prestigious scientific centres also boosts the chances of funding international projects.

Assumptions:

- The length of stays will vary from 1 to 6 months and the funds will be granted based on competition.
- Selection criteria will take into account the scientific significance of the project, the achievements of an applicant, the quality of host institution. Detailed regulations will be developed by a committee appointed by the Rector.



- The total cost of the action comprises about 100 person-months per year assuming 10,000 PLN per month in average (it will vary depending on the country to be visited and position of an applicant).
- The programme will complement external programmes, such as programmes of the Polish National Agency for Academic Exchange (NAWA), which support research mobility.
- *Milestones (M=month):*
  - (a) Selection of a team for assessment of applications and development of regulations: M5,
  - (b) Conclusion of the 1st competition: M12,
  - (c) Conclusion of the 2nd competition: M24,
  - (d) Conclusion of the 3rd competition: M36,
  - (e) Conclusion of the 4th competition: M48,
  - (f) Conclusion of the 5th competition: M60.

## (10) Programme of grants for foreign visiting professors post-docs and doctoral candidates

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Costs: 6 000 000,00 | Duration: 1 - 72 months

The programme of grants for funding visits to the University of foreign scientists and doctoral candidates will foster international scientific exchange. Research carried out by world-class specialists at WUT significantly improves the prestige of the University.

WUT can attract foreign students and scientists with well-equipped research and teaching laboratories but the offer for accomplished experts from prestigious HEIs also requires attractive grants for doctoral students, post-doc interns and visiting professors.

Assumptions:

- The presence of foreign experts at the University has an impact on the staff internationalisation index and encourages changes in teaching, especially of doctoral students.
- It is foreseen to award annually:
  - 4 monthly grants for visiting professors a 30,000 PLN;
  - 36 monthly grants for post-docs a 16,000 PLN;
  - 48 monthly grants for doctoral candidates a 8,000 PLN.
- In the course of the action, we plan to make good use of existing opportunities of funding such exchanges with grants of the Polish National Agency for Academic Exchange (NAWA).
- *Milestones (M=month):*
  - (a) Selection of a team for assessment of applications and development of regulations: M5;
  - (b) Conclusion of the 1st competition: M12,
  - (c) Conclusion of the 2nd competition: M24,
  - (d) Conclusion of the 3rd competition: M36,
  - (e) Conclusion of the 4th competition: M48,
  - (f) Conclusion of the 5th competition: M60.

## (11) WUT's International Brand Programme

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Costs: 9 200 000,00 | Duration: 1 - 72 months

The programme will mainly be used to improve WUT's International recognisability. In addition to the quality of the research, the University's recognisability and brand are significant factors in international rankings. WUT is a top university among Polish HEIs ranked in international rankings, especially in the University's main research areas.

Assumptions:

- The programme of WUT's International Brand will improve WUT's international recognisability. It entails both participation in prestigious international programmes (e.g., European University Initiative), International research projects and strengthening promotion of scientific and innovative achievements.
- It will also support activity of academics in international scientific associations and research networks.
- The programme also covers trainings on the promotion of scientific achievement and funds for the promotion.
- The action will be co-funded from the University's own resources.
- The total cost of the action comprises:
  - modernization of webpages,
  - presence in social media (regulated and active, similar to top European universities),
  - modernizing the remote transmission infrastructure in terms of professional video recording,
  - participation in conferences and meetings, collaboration with embassies,
  - WUT brand ambassadors at partner universities,
  - development of the promotional offer (store with branded WUT items) addressed to partners, students and graduates.
- *Milestones (M=month):*
  - (a) *Development of the core assumptions of the WUT's International Brand Programme: M3,*
  - (b) *Programme of trainings on promotion of scientific achievements: M5.*

## (12) Further development of the Knowledge Base with the aim of promoting research activity of the Warsaw University of Technology

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Costs: 4 400 000,00 | Duration: 1 - 36 months

The Knowledge Base of the Warsaw University of Technology is a unique CRIS-type tool (Current Research Information System), which can also be considered as an efficient promotion channel. The system enables users not only to provide access to data, but also to objectively interpret, organise, compare and analyse it.

Assumptions:

- It currently collects resources in the form of publications, diploma theses and doctoral dissertations.

The proposed action will enhance the base with the following modules:

- (1) Repository of research data - additionally, to develop and implement this module, guidelines will be developed on data storage formats, organisation and description (methodology, standards, metadata), intellectual property, storage and protection.
- (2) Commercialisation – a coherent information system will be developed comprising information on research, expert opinions, and innovation projects transferred by WUT on market terms to the business environment.
- (3) Research equipment - full information on WUT's equipment and facilities, which will contribute to their rational use at the University.
- The total cost of the action comprises:
  - 4 positions (2 x junior programmer, 1 x senior programmer, 1 x analyst) x 36 months, PLN 432.000 annually x 3 years = PLN 1.296.000; 2 positions (1 x senior programmer, 1 x analyst) x 36 months, PLN 250.000 annually x 3 years = PLN 750.000
- *Milestones (M=month):*
  - (a) *Launch of module (1): M30,*
  - (b) *Launch of module (2): M42,*
  - (c) *Launch of module (3): M54.*

## (13) Regulations and practices aimed at shaping the student population as appropriate for a research university

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Costs: 10 000,00 | Duration: 1 - 72 months

- Actions aimed at shaping the student population as appropriate for a research-intensive university will include, among other things:
  - (a) lowering the admission limits and increasing the requirements (thresholds) of admissions to first-cycle degree programmes, in particular to programmes in English as the language of instruction,
  - (b) raising the admission requirements for second-cycle programmes, in particular to programmes in English as the language of instruction,
  - (c) promotion and marketing at home and abroad, positioning the University, as well as showing its prestige, especially the recognition by employers.
- The actions will take into account the priorities established in the course of defining POBs.
- These actions will lead to decreasing the number of first-cycle students, while maintaining or increasing the number of second-cycle students, which will contribute to:
  - (a) a desirable change in the proportion of students educated in first- and second-cycle degree programmes,
  - (b) obtaining the desired value of the "students-to-staff ratio" index, and also, by taking into account the priorities established in the course of defining POBs,
  - (c) the strengthening of the research potential within POBs (students doing research projects, additional academic staff).
- Owing to more restrictive admission requirements, students who are admitted will be better prepared for project - and research-based education. This will increase the efficiency of the teaching and learning process, which is difficult to achieve when there are significant

differences in potential and competences of students present in the classroom. In this context, it should be noted that a quantitative development of education in POB-related fields of study will not lead to a decrease in the quality of education since study programmes in these fields of study enjoy the greatest popularity among candidates and the admission thresholds are high. Moreover, actions towards making the education process more attractive will additionally increase the interest of candidates in these degree programmes.

- Costs: The actions will be funded primarily from the University's own resources.
- *Milestones (M=month):*
  - *modification of admission requirements: M6,*
  - *modification of admission limits for the first-cycle degree programmes: M6.*

## **(14) Orientation of the development of the course offer towards its correlation with research, especially within POB**

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Costs: 10 000,00 | Duration: 1 - 72 months

- The actions completed thus far aimed at developing and updating WUT's educational offer (fields of study, specialisations) will be carried on while focusing on the priorities established in the course of defining POBs. This means, in particular:
  - (a) launching new degree programmes in Polish and in English as the language of instruction in POB-related fields of study,
  - (b) introduction of new specialisations in degree programmes in POB-related fields of study.
- In other areas, the educational offer of the University will be shaped on the basis of observed advances in science and technology and forecasts of social needs.
- Costs: The actions will be funded primarily from the University's own resources or funds acquired from other programmes.
- *Milestones (M=month):*
  - *Introduction of 4 new degree programmes in POB-related fields of study: M36.*

## **(15) Reorientation of teaching and learning objectives and methods**

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Costs: 10 000,00 | Duration: 1 - 72 months

The teaching and learning objectives and methods are planned to be reoriented towards stimulation of innovative and entrepreneurial attitudes of students, and preparation for team work when solving complex interdisciplinary problems that require research skills.

Assumptions:

- To achieve this aim, we will promote innovative methods of teaching and learning which motivate and activate students, developed, inter alia, by the INFOX team. In particular, we will rely on project-based learning.

- Subjects of projects will be correlated with research, especially research carried out in collaboration with industry and other partners.
- We will also create mechanisms that awaken passion, encourage students to get involved in student research groups, academic incubators etc.
- Enhancements in study programmes will be related to the following:
  - (a) learning outcomes,
  - (b) increasing flexibility of study programmes, which would enable significant individualisation of the educational pathways,
  - (c) methods of teaching (more project-based learning),
  - (d) wider use of Open Educational Resources, especially those made available by internationally renowned HEIs and development of the WUT's own resources, which will enable various forms of blended learning and flipped education,
  - (e) changes in the methods of verification of learning outcomes.
- We will also introduce some "groundbreaking" changes. In 2020, the Faculty of Electronics and Information Technology will offer a new experimental first-cycle degree programme, with an innovative organisation of the first year of study. Its main component will be a team project (on the subject related to the Internet of Things) supervised by a tutor, which will require students to acquire knowledge on their own and learn certain design techniques and research methods.  
Experiences related to this programme will be used when undertaking further initiatives of a similar character.  
Innovations in teaching and learning will be supported by creation of open learning spaces, and further development of the activity of the INFOX team - it is planned to transform it into a unit that does more extensive research on engineering education.
- Costs: The actions will be funded primarily from the University's own resources or funds acquired from other programmes.
- *Milestones (M=month):*
  - *Development of good practices and recommendations in the area of using innovative teaching and learning approaches: M3,*
  - *Changes in the scope of activity of the INFOX team: M12.*

## (16) Supporting the development of exceptionally gifted students

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Expected total costs: 2 100 000,00 | The starting date and deadline for completion of the action 1 - 72 months

As has been the case so far, numerous competitions for secondary school pupils organised or co-organised by WUT will enable the University to source its first-degree students from among gifted pupils. Competition winners along with winners of national-level school contests and science olympiads receive a guaranteed place at WUT in any field of study related to the subject of competition.

#### Assumptions:

- A special programme will be created whose aim will be, on the one hand, to encourage gifted candidates to take up studies at WUT and, on the other, to use their potential appropriately and to adequately support their development.
- Such students:
  - (a) will receive individual support from outstanding academic teachers,
  - (b) will follow specially designed, individual study programmes with an increased research component,
  - (c) will be offered an opportunity to participate in extracurricular activities (summer schools etc.),
  - (d) will participate in research projects, particularly within POBs, starting from their first year at WUT.
- The programme will become a testing ground for learning analytics as a tool to identify students with exceptional abilities. Gifted and active students will have the opportunity - as has been the case so far - to undertake activities within student research groups.
- In order to intensify this kind of activity in collaboration with businesses related to POBs, a programme will be set up to enable student research groups to obtain funds for the implementation of more ambitious, cutting-edge research ventures.
- Costs: Each year:
  - (1) 10 grants for student research groups 30 000 PLN on average each,
  - (2) extracurricular activities (summer schools etc.) - 50 000 PLN on average; total costs: 350 000 PLN x 6 years = 2 100 000 PLN.
- *Milestones (M=month):*
  - (a) *Start of the programme supporting the development of exceptionally gifted students: M6,*
  - (b) *First call for competition for grants for student research groups: M3, subsequent calls - every year.*

## (17) Providing adequate conditions for obtaining International accreditations

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Costs: 870 000,00 | Duration: 1 - 72 months

Obtaining an international accreditation (ABET, KAUT KAUT-ENAE, accreditation agencies for individual fields of engineering) should become compulsory for each of the degree programmes in English as the language of instruction related to POBs. However, such an accreditation should also become an objective for other degree programmes, especially in the case of new or significantly modified programmes.

#### Assumptions:

- In order to complement the accreditations for individual degree programmes, WUT plans to obtain an institutional accreditation under the Institutional Evaluation Programme, which is run by the European University Association.
- Obtaining International accreditations will be promoted by:
  - (a) reorienting priorities in internationalisation of education – high quality and not the number of students becoming the priority in order to transform study programmes

taught in English - especially programmes in areas related to POBs - into an elite form of studies, which will also be attractive to Polish students,

- (b) creating within the University community (students and staff) a culture of everyday contact with the English language by, among other things, introducing the obligation to take a certain number of modules (including diploma seminars) in English as part of the requirements for graduating from second-degree programmes (and ultimately also first-degree programmes) and creating incentives for writing theses in English,
  - (c) making wider use of Open Educational Resources, particularly the resources provided by renowned foreign HEIs, and developing WUT's own English-language resources,
  - (d) organising the teaching and learning process in a way that promotes the international mobility of students and academic teachers (especially for incoming students and visiting lecturers), especially in POB-related fields of study,
  - (e) creating a programme to boost language competences of staff, especially employees dealing with the administrative side of the education process,
  - (f) participating in prestigious academic cooperation programmes, in particular in the European Universities Initiative.
- Costs: participation in EUA Institutional Evaluation Programme – 220 000 PLN, accreditation by ABET (4 degree programmes) - 500 000 PLN, accreditation by KAUT-ENAAE (10 degree programmes) - 150 000 PLN; total costs: 870 000 PLN.
  - *Milestones (M=month):*
    - *Obtaining an institutional accreditation under the Institutional Evaluation Programme offered by the European University Association: M36.*

## (18) Scholarship programmes for doctoral candidates

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Costs: 39 888 000,00 | Duration: 1 - 72 months

- In order to increase the University's development potential, in the first, critical period after the introduction of the new model of doctoral education (doctoral schools), we plan, unlike the majority of Polish HEIs, to maintain the number of doctoral candidates at an unchanged level.
- An appropriate "critical mass" of doctoral candidates will:
  - (a) wzmocni działalność naukową Uczelni,
  - (b) enable the creation of POB-compliant educational pathways in doctoral schools,
  - (c) enable to offer doctoral candidates a large number of courses related to the relevant scientific disciplines and courses aimed at the development of transferable competences.
- We will create a scholarship fund for doctoral candidates, which will supplement the funds from the subsidy the University receives. This initiative will be supplemented by measures aimed at:
  - receiving the largest possible number of grants from the "Industrial PhD" programme (WUT has achieved some major successes in this field),
  - stimulating the efforts of potential supervisors to receive grants that enable the financing of doctoral scholarships, particularly for international doctoral candidates.
- Additionally, in order to stimulate the research activity of doctoral candidates, WUT will start a pro-quality scholarship programme. The scholarships will be granted to outstanding doctoral

candidates. In competitions organised by doctoral schools, publications in scientific journals (their quality, not quantity), citations, patents, international internships and participation in research projects will be considered.

- Costs:
  - scholarships - 40 new scholarships for years 1-3; the number of recipients: 40 (2020), 80 (2021), 120 (2022 i 2023), 80 (2024), 40 (2025); costs:  $(40 + 80 + 120 + 120 + 80 + 40) \times 12 \text{ months} \times 3800 \text{ PLN/month} = 21\,888\,000 \text{ PLN}$ ;
  - (2) pro-quality scholarships for 10% of doctoral candidates - on average 125 scholarships each year; costs:  $125 \times 12 \text{ months} \times 2000 \text{ PLN/month} \times 6 \text{ years} = 18\,000\,000 \text{ PLN}$ ; total costs: 39 888 000 PLN.
- *Milestones (M=month):*
  - *Start of the scholarship programme aimed at keeping the number of doctoral candidates unchanged: M6; followed by granting scholarships in two subsequent years*
  - *(b) Start of the pro-quality scholarship programme: M1, subsequent calls - every year.*

## (19) Supporting doctoral candidates' overall development, which leads to their successes in research and prepares them for pursuing diverse career paths

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Costs: 1 200 000,00 | Duration: 1 - 72 months

We plan to develop the "Researcher's Workshop" - a collection of several (10-15) class modules, run in Polish and English, which shape transferable competences of doctoral candidates. "Researcher's Workshop" would be independent of any scientific discipline, but would significantly increase the efficiency of research work, as well as prepare doctoral candidates to pursue diverse career paths, also outside the academic community.

Assumptions:

- "Researcher's Workshop" shapes competences (knowledge and skills) in the following areas:
  - (a) methodological and ethical aspects of research,
  - (b) presenting and disseminating the results of research (using the opportunities presented by Open Science), also in popular form,
  - (c) raising funds for research,
  - (d) planning and implementing research projects,
  - (e) transferring the results of research to the economic and social spheres,
  - (f) planning and teaching classes using innovative methods and tools.
- The doctoral candidates integrate selected modules of the "Researcher's Workshop" into their individual study programmes according to their needs and preferences.
- Costs: The action will be funded primarily from the University's own resources or funds acquired from other programmes.
- *Milestones (M=month):*
  - *Designing the collection of modules that comprise the "Researcher's Workshop": M3,*
  - *Offering of selected modules to doctoral candidates: M9.*



## (20) Stimulating the internationalisation of doctoral schools

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Costs: 7 440 000,00 | Duration: 1 - 72 months

The efforts already taken to internationalise the doctoral schools will be supplemented by:

- (a) measures to stimulate better use of the national programmes supporting the internationalisation of doctoral education (e.g. programmes run by the National Agency for Academic Exchange - NAWA),
- (b) the development of WUT's own "visiting professors" programme, which would support the doctoral education, in particular in areas related to POBs,
- (c) earmarking - within the scholarship fund for doctoral candidates - funds for international doctoral candidates who conduct research in areas related to POBs,
- (d) creating a programme to support joint doctorates (e.g. under the cotutelle formula),
- (e) organising international summer and winter schools for doctoral candidates,
- Costs:
  - (1) "WUT Visiting Professor" programme: each year 6-month visit of 7 professors (one for each POB):  $7 \times 20\,000 \text{ PLN/month} \times 6 \text{ months} \times 6 \text{ years} = 5\,040\,000 \text{ PLN}$ ;
  - (2) joint doctorates – on average 10 proceedings each year:  $10 \times 30\,000 \text{ PLN} \times 6 \text{ years} = 1\,800\,000 \text{ PLN}$ ; (3) international summer and winter schools, on average 2 schools each year:  $2 \times 50\,000 \text{ PLN (on average)} \times 6 \text{ years} = 600\,000 \text{ PLN}$ ; total costs: 7 440 000 PLN.
- *Milestones (M=month):*
  - (a) Start of the "WUT Visiting Professor" programme: M3,
  - (b) Start of the joint doctorates programme: M3.

## (21) Talent management programme

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Expected total costs: 450 000,00 | The starting date and deadline for completion of the action 1 - 72 months

The talent management programme described below applies to doctoral candidates and WUT employees at the beginning of their academic career - before and after they obtain a doctoral degree.

Assumptions:

- The talent management programme will enable quick development of early stage researchers particularly destined to further their academic career. The programme will include:
  - (a) identifying such persons, especially from among candidates admitted to doctoral schools,
  - (b) determining their potential, particular abilities and competence profile,
  - (c) analysing their needs and preferences,
  - (d) designing individual development plans,
  - (e) monitoring, evaluating and correcting the plans,
  - (f) suggesting an academic career development path.
- The individual development plans may include support in the form of, inter alia:
  - (a) financing access to unique equipment outside of WUT,

- (b) financing of specifically tailored training sessions, study visits and participation in scientific events,
- (c) being granted preference when applying for grants and pro-quality scholarships offered by WUT,
- (d) team supervision,
- (e) pursuing tailor-made study programme at a doctoral school
- The process of implementing individual development plans will utilise elements of other initiatives, such as:
  - (a) the programme of visits in renowned international research centres,
  - (b) the training programmes for future research leaders and mentors,
  - (c) pro-quality scholarships being part of the scholarship programme for doctoral candidates.
- A comprehensive approach to talent management in conjunction with the WUT brand will contribute to increasing the number of the most talented Polish and international candidates for doctoral schools.
- Reinforcing the perception of WUT as an institution that supports the development of potential and presents an attractive vision of academic career to young outstanding researchers will be an added value.
- Costs: development of the programme - 20 000 PLN; the actions related to its implementation will be funded primarily from the University's own resources or funds acquired from other programmes.
- *Milestones (M=month):*
  - *Start of the programme (first recruitment of ca. 10 participants): M6, subsequent recruitments (each time ca. 10 participants) - every year.*

## (22) Introducing training programmes for future research leaders and mentors for young academic teachers

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Costs: 4 080 000,00 | Duration: 1 - 72 months

### Assumptions:

- Creating a list of good practices for supervisors and mentors for young academic teachers,
- Organising workshops, training sessions and study trips to leading research institutions around the world will all facilitate raising the staff's competences in terms of providing scientific guidance.
- *Milestones (M=month):*
  - *(a) Creating a list of good practices for supervisors and mentors for young academic teachers,*
  - *(b) Selecting institutions, which will become destinations for study visits, (c) Recruiting participants of training programmes for future research leaders and mentors for young academic teachers.*

## **(23) Providing courses, internships and study visits to academic teachers, which enable the implementation of modern teaching methods, including Research-Based Education**

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Costs: 2 760 000,00 | Duration: 1 - 72 months

Expanding the existing course, internship and study visit offer designed for WUT's academic teachers. This relates in particular to study and training visits to international institutions aimed at increasing competences related to research and modern teaching methods.

- *Milestones (M=month):*
  - *Selecting institutions, which will become destinations for study visits,*
  - *Recruiting academic teachers for courses, internships and study visits.*

## **(24) Organising governance-themed training sessions, which improve governance competences of managerial staff**

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Costs: 2 160 000,00 | Duration: 1 - 72 months

Expanding the offer of existing training sessions and workshops, which improve governance competences of managerial staff.

- *Milestones (M=month):*
  - *Developing a programme of governance-themed training sessions, which improve governance competences of managerial staff,*
  - *Recruiting training session participants.*

## **(25) Introducing an incentivising remuneration scheme and transparent rules of academic career advancement, in line with the European Charter for Researchers**

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Costs: 10 000,00 | Duration: 1 - 72 months

Finishing work on regulations concerning remuneration and career advancement for academic teachers. The introduction of updated rules and regulations will be the chief milestone here.

## (26) Formulating rules for comprehensive and flexible staff evaluation

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Costs: 10 000,00 | Duration: 1 - 72 months

Developing rules for interim evaluation adjusted to the needs of a research university and WUT's new Statute.

## (27) Improving the collaboration between scientists and the administration

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Costs: 1 250 000,00 | Duration: 1 - 72 months

Analyses show that there is a barrier of mistrust between research and administrative staff. The mutual inability to understand each other's roles combined with a low level of motivation in terms of the remuneration system create a great obstacle to building a positive relationship. The objective here is the professionalisation of the administrative service by integrating all employees around a shared goal, as well as combined incentive mechanisms and remuneration rules.

Assumptions:

- The objective shall be met through the following measures:
  - (a) mobility support for administrative staff (including participation in training sessions, conferences and working groups, also internationally, within the scope of their duties),
  - (b) increasing the flexibility of WUT's staff structure, developing mechanisms, which would enable the creation of task forces made up with Staff from different units and departments (academic teachers, administration),
  - (c) professionalising and increasing the pool of administrative experts to provide support for scientific staff in implementing research projects.
- Estimated costs refer mainly to study trips for administrative staff (about 5000 PLN x 30 employees x 6 years), as well as the handling of mobility plan.
- *Milestones (M=month):*
  - (a) *Carrying out a survey of satisfaction levels regarding the relationship between the scientific and administrative staff: M12,*
  - (b) *Implementing of the mobility support program for administrative staff: M24,*
  - (c) *Development of processes of recruitment and appointment of administrative support teams members: M24.*

## (28) Operating the "Research University" programme

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Expected total costs: 9 900 000,00 | The starting date and deadline for completion of the action 1 - 72 months

This measure is the central element of WUT's transformation into a research university of high international reputation. Its execution will also rely on the creation of a working group to monitor the implementation of the defined strategic goals and the values of assumed control indicators.

Assumptions:

- The group's most important tasks will include:
  - developing WUT's development strategy and excellence strategy within POB;
  - organising dedicated resources and processes to implement and control an assumed strategy;
  - effective use of programmes and initiatives to support the university's developments (e.g. PO WER, MNiSW and NAWA competitions), preparing applications in terms of the implementation of strategic objectives;
  - coordinating development-related measures for the whole of WUT;
  - active change management at WUT;
  - monitoring programmes that support the development of the university's potential and their compliance with strategic goals;
  - concern for the consistency of WUT's development strategy with quality evaluation criteria of scientific activity and the status of research university,
  - creating public awareness of expectations and requirements relating to units' achievements and staff,
  - defining the scope of scientific employees' duties and the settlement of the effects of their work.
- The estimated costs mainly include the remuneration of members team responsible for implementation of the project (about 10 employees x 150000 PLN x 6 years).
- *Milestones (M=month):*
  - (a) *Creation of the "Research University" working group: M6,*
  - (b) *Team evaluation and its improvement plan: M36.*

## (29) Introduction of Management by Objectives (MBO)

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Expected total costs: 5 500 000,00 | The starting date and deadline for completion of the action 1 - 72 months

The introduction of Management by Objectives (MBO) across WUT is the key management measure whose aim is to improve the quality of the University's work. The strategic goals relating to scientific research, international collaboration and modern education will be transformed into a hierarchical structure covering all organisational units and their staff.

Assumptions of this measure:

- introducing different timeframes for a goals system: tactical (quarterly) and strategic (annual and triennial);

- introducing mechanisms for clearing goals through running reporting;
- designing and implementing a system of determining, monitoring and clearing organisational units' goals;
- introducing mechanisms for organisational unit evaluation and for bringing consequences in cases of unfulfilled expectations;
- defining a mechanism for defining individual goals for all members of staff in relation to their role and type of their work;
- implementing staff evaluation regulations in terms of achieving individual goals as well as procedures to define consequences in cases of unfulfilled minimum requirements.
- Budget calculation consists development in 2020-2021 and further maintenance of IT reporting system.
- *Milestones (M=month):*
  - *Implementing rules of formulating goals for organisational units: M12,*
  - *Implementing rules of formulating individual goals for employees: M24.*

## (30) Adjusting the organizational structure to support the goals of a research University

Costs: 6 300 000,00 | Duration: 1 - 72 months

A measure whose aim it is to adjust the University's organisational structure to the needs related to WUT's transformation into a research university. It is directly connected with the specific objective defined in the Improving the quality of governance area.

Assumptions:

- The first activity will be to define the administrative and financial needs of heads of research teams running projects within POB. On the basis of these analyses, and the description of the current structure of the university, a new organisational shape will be proposed. Various operating models for administrative support units will be considered (universal, specialist or mixed) to enable the implementation of the determined goals.
- The aim of the new structures is to reach the effect of synergy from combining selected resources and moving the freed-up reserves to other tasks.
- The new structures will work closely with the Research Centre Network and provide each POB Research Centre with the highest level of administrative support adjusted to its current needs. It is crucial for the appointed structure to have competences and resources at its disposal to enable the swift functioning in all key areas on the formal side of research projects: staffing, public procurement procedures as well as reporting and financial control processes.
- Most staff in the new administrative structures will be financed from other WUT sources. For this task, covering the costs of only a small team, which will become the core of an entire structure, has been provided.
- The cost estimation is based on the remuneration for members of administrative support teams operating within the POB Research Centre Network (about 10 employees x 100000 PLN x 6 years).
- *Milestones (M=month):*
  - *(a) Designing a new organisational structure: M12,*
  - *(b) Modernising the structure under transformation: M36.*

## (31) Optimising administrative processes through the introduction of Process Management focused mainly on research projects

Costs: 12 000 000,00 | Duration: 1 - 72 months

This measure covers a number of activities aimed at improving the productivity and efficiency of administrative processes at WUT, which is closely connected with the specific objective defined in the Improving the quality of governance area.

Assumptions:

- The most important task will be to develop and manage, on a day-to-day basis, the map of administrative processes at WUT. In the first place, attention will be given to those processes that affect research activities. To do this, a specialist team at the top of the organisation's hierarchy will be called to run an independent review of relevant processes. Its main aim will be to suggest and implement changes that lead to a clear optimisation of the University's activities (the elimination of unnecessary, repetitive activities, consolidation, decentralisation).
- As well as this, regular monitoring of operating expenses will also be introduced. An IT system will enable current, monthly reporting of running costs of operational activities and projects at all levels of the organisational structure in order to carry out checks of budget plans.
- An identified source of low process efficiency are deficiencies in the electronic circulation of documents. This is why, as part of this measure, WUT plans to fully implement such a system in three stages:
  - (1) The analysis of internal procedures in terms of document circulation and project management;
  - (2) The development of guidelines for the electronic document circulation system and the unification and reduction of administrative formalities that regulate the circulation of documents.
  - (3) The development and implementation of the electronic document circulation system
  - (4) The system's integration into other sources of knowledge on research activities. By using the synergy effect, this will facilitate the application process for research competitions and implementing projects.
- The budget of this activity consists of personnel costs (about 10 employees x 100000 PLN x 6 years) and the costs of implementing and maintaining an document automation system.
- *Milestones (M=month):*
  - (a) *Creating a process management team: M6,*
  - (b) *Maintaining the document automation IT system: M36.*

### 2.4 Indicators

Indicators used to measure the progress of the plan's implementation, specified in quantitative form and qualitative, depending on the adopted definitions and calculation methods, are presented in the table below.

## Indicators

### Mandatory indicators

*Indicator 1: % Articles in Top 10% (U and P) - according to the indicated database*

for a university as a whole / for each priority research area *	Reference years for base values						Reference years for target values
	2013	2014	2015	2016	2017	Value for the period 2013–2017	Value for the period 2020–2024
An indicator for a university as a whole	11,10	9,90	10,10	14,30	15,10	12,30	14,80
	A number of articles in top 10% in WoS or Scopus in the reference years and period.					YEAR 2013 - 111 articles   YEAR 2014 - 115 articles   YEAR 2015 - 131 articles   YEAR 2016 - 204 articles   YEAR 2017 - 217 articles   Value for the period 2013-2017 - 778 articles   Value for the period 2020-2024 - 1015 articles	
Photonic Technologies	8,90	7,20	9,20	12,10	11,90	10,00	12,00
	A number of articles in top 10% in WoS or Scopus in the reference years and period.					YEAR 2013 - 44 articles   YEAR 2014 - 38 articles   YEAR 2015 - 54 articles   YEAR 2016 - 76 articles   YEAR 2017 - 76 articles   Value for the period 2013-2017 - 288 articles   Value for the period 2020-2024 - 375 articles	
Artificial Intelligence and Robotics	6,60	9,30	6,20	10,60	15,30	9,60	11,50
	A number of articles in top 10% in WoS or Scopus in the reference years and period.					YEAR 2013 - 10 articles   YEAR 2014 - 16 articles   YEAR 2015 - 14 articles   YEAR 2016 - 17 articles   YEAR 2017 - 30   Value for the period 2013-2017 - 87   Value for the period 2020-2024 - 115 articles	
Cybersecurity and Data Science	12,20	18,10	12,50	13,70	18,50	15,20	18,20
	A number of articles in top 10% in WoS or Scopus in the reference years and period.					YEAR 2013 - 11 articles   YEAR 2014 - 17 articles   YEAR 2015 - 12 articles   YEAR 2016 - 16 articles   YEAR 2017 - 25   Value for the period 2013-2017 - 81   Value for the period 2020-2024 - 105 articles	



Biotechnology and Biomedical Engineering	14,30	8,90	8,20	11,50	11,70	10,80	13,00
	A number of articles in top 10% in WoS or Scopus in the reference years and period.					YEAR 2013 - 21 articles   YEAR 2014 - 15 articles   YEAR 2015 - 17 articles   YEAR 2016 - 26 articles   YEAR 2017 - 25   Value for the period 2013-2017 - 104   Value for the period 2020-2024 - 135 articles	
High Energy Physics and Experimental Techniques	15,50	12,20	12,30	21,40	22,00	17,00	20,40
	A number of articles in top 10% in WoS or Scopus in the reference years and period.					YEAR 2013 - 66 articles   YEAR 2014 - 60 articles   YEAR 2015 - 71 articles   YEAR 2016 - 129 articles   YEAR 2017 - 135   Value for the period 2013-2017 - 461   Value for the period 2020-2024 - 550 articles	
Materials Technologies	9,20	9,90	10,60	13,40	12,50	11,30	13,60
	A number of articles in top 10% in WoS or Scopus in the reference years and period.					YEAR 2013 - 23 articles   YEAR 2014 - 26 articles   YEAR 2015 - 36 articles   YEAR 2016 - 46 articles   YEAR 2017 - 44   Value for the period 2013-2017 - 175   Value for the period 2020-2024 - 230 articles	
Energy Conversion and Storage	7,90	8,40	7,70	10,80	11,10	9,20	11,00
	A number of articles in top 10% in WoS or Scopus in the reference years and period.					YEAR 2013 - 36 articles   YEAR 2014 - 44 articles   YEAR 2015 - 46 articles   YEAR 2016 - 62 articles   YEAR 2017 - 65   Value for the period 2013-2017 - 253   Value for the period 2020-2024 - 330 articles	

**Indicator 2: Normalized Citation Impact (U and P) - according to the indicated database**

for a university as a whole / for each priority research area *	Reference years for base values						Lata referencyjne dla wartości docelowych
	2013	2014	2015	2016	2017	Value for the period 2013–2017	Value for the period 2020–2024
An indicator for a university as a whole	1,14	1,19	1,03	1,15	1,11	1,12	1,20
Photonic Technologies	1,03	0,93	0,91	1,02	0,99	0,98	1,10
Artificial Intelligence and Robotics	1,48	1,03	0,97	1,20	1,18	1,16	1,25
Cybersecurity and Data Science	1,71	1,39	1,20	1,09	1,32	1,32	1,35
Biotechnology and Biomedical Engineering	1,18	1,20	0,89	0,99	0,94	1,02	1,05
Materials Technologies	0,93	1,05	0,85	1,00	0,91	0,94	1,05
High Energy Physics and Experimental Techniques	1,52	1,25	1,17	1,58	1,48	1,40	1,45
Energy Conversion and Storage	1,01	0,92	0,79	0,91	0,86	0,89	1,05

**Indicator 3: % Articles in International Collaborations (P) - according to the indicated database**

for a university as a whole / for each priority research area *	Reference years for base values						Reference years for target values
	2013	2014	2015	2016	2017	Value for the period 2013–2017	Value for the period 2020–2024
Photonic Technologies	31,70	30,00	29,50	28,90	33,50	30,70	35,00
Energy Conversion and Storage	29,10	27,80	26,80	27,40	32,60	28,70	31,00
Materials Technologies	38,00	37,60	33,60	32,60	36,20	35,40	37,00
High Energy Physics and Experimental Techniques	38,40	34,80	35,00	46,00	47,60	40,80	43,00
Biotechnology and Biomedical Engineering	42,20	35,10	39,10	31,70	33,30	35,90	37,00
Artificial Intelligence and Robotics	27,00	25,00	17,30	30,40	36,20	26,80	30,00
Cybersecurity and Data Science	34,40	36,20	20,80	32,50	34,10	31,80	33,00

**Indicator: International Research Grants (P)**

for each priority research area *	Number of grants in 2014-2018	Number of grants in 2021-2025
Photonic Technologies	3	6
Artificial Intelligence and Robotics	0	3
Cybersecurity and Data Science	2	3
Biotechnology and Biomedical Engineering	10	11
Materials Technologies	4	6
High Energy Physics and Experimental Techniques	6	7
Energy Conversion and Storage	2	5

A list of the most important grants received in the years 2014–2018 (up to ten grants for each priority research area) which comprises a project title, name of grant funder and date of conclusion of a contract.

#### POB - Photonic Technologies

No	Project title	Name of grant funder	Date of conclusion of a contract
1	ACTPHAST 4R - Accelerating Photonics Deployment via one Stop Shop Advanced Technology Access for Researchers. Horizon2020	European Commission	12-11-2018
2	ACTPHAST 4.0 - ACceleraTing PHotonics innovATion for SME?s: a one STop-shopincubator. Horizon2020	European Commission	20-10-2017
3	PICs4All - Photonic Integrated Circuits Accessible to Everyone. Horizon2020	European Commission	11-11-2015

#### POB - Cybersecurity and Data Science

No	Project title	Name of grant funder	Date of conclusion of a contract
1	Covert Communication Detection (CoCoDe)	Air Force Office of Scientific Research USAF (AFOSR)	13-06-2017
2	IoRL - Internet of Radio Light. Horizon2020	European Commission	08-06-2017

#### POB - Biotechnology and Biomedical Engineering

No	Project title	Name of grant funder	Date of conclusion of a contract
1	ACTPHAST 4R - Accelerating Photonics Deployment via one Stop Shop Advanced Technology Access for Researchers. Horizon2020	European Commission	12-11-2018

2	MgSafe3 - Promoting patient safety by a novel combination of imaging technologies for biodegradable magnesium implants. Horizon2020	European Commission	20-08-2018
3	Patient-specific bioactive, antimicrobial PLAPGA/titanium implants for large jawbone defects after tumour resection. M.ERA-NET 2016	The National Centre for Research and Development	27-12-2017
4	ACTPHAST 4.0 - ACceleraTing PHotonics innovAtion for SME's: a one STop-shop-incubator. Horyzont 2020	European Commission	20-10-2017
5	Bioengineered in vitro model of retinal pigmented epithelium of human eye. UNISONO-M.ERA-NET2	National Science Center	01-08-2017
6	PRINT-AID - Multidisciplinary European training network for development of personalized antiinfective medical devices combining printing technologies and antimicrobial functionality. Horyzont 2020	European Commission	09-08-2016
7	Development of bone tumor model with 3D printed and lyophilized scaffolds. BILATERAL COOPERATION POLAND TURKEY	The National Centre for Research and Development	28-04-2016
8	Consolidation of 3D printing, cell biology and material technology for the development of bioprinted meat- A prototype study. BILATERAL COOPERATION POLAND TAIWAN	The National Centre for Research and Development	20-04-2016
9	Infrared radiation shielding properties of modified graphene oxide based materials. BILATERAL COOPERATION POLAND TAIWAN	The National Centre for Research and Development	01-04-2016
10	Surface Modification of Polyurethane Vascular Graft. BILATERAL COOPERATION POLAND TAIWAN	The National Centre for Research and Development	15-04-2015

### POB - Materials Technologies

No	Project title	Name of grant funder	Date of conclusion of a contract
1	MgSafe3 - Promoting patient safety by a novel combination of imaging technologies for biodegradable magnesium implants. Horizon2020	European Commission	20-08-2018
2	3D/4D quantitative phase imaging for neuroscience at cellular level. BILATERAL COOPERATION POLAND TAIWAN	The National Centre for Research and Development	01-08-2018
3	Nonlinear interaction of structured light beams with matter. HARMONIA	National Science Center	12-05-2017
4	PRINT-AID - Multidisciplinary European training network for development of personalized anti-infective medical devices combining printing technologies and antimicrobial functionality. Horizon2020	European Commission	09-08-2016

### POB - High Energy Physics and Experimental Techniques

No	Project title	Name of grant funder	Date of conclusion of a contract
1	Research of fundamental properties of nuclear matter in the ALICE experiment at the Large Hadron Collider LHC at CERN. HARMONIA	National Science Center	30-03-2017
2	ARIES - Accelerator Research and Innovation for European Science and Society. Horizon2020	European Commission	21-12-2016
3	Study of proton-proton, hadron-nucleus and nucleus-nucleus relativistic collisions in the NA61/SHINE experiment at the CERN SPS. -2nd phase. HARMONIA	National Science Center	11-07-2016

4	COMPASS experiment - three-dimensional study and spin nucleon structure. HARMONIA	National Science Center	23-05-2016
5	T2K - second generation neutrino experiment. HARMONIA	National Science Center	20-07-2015
6	SKPlus - Super-Kamiokande plus. Horizon2020	European Commission	18-11-2014

#### POB - Energy Conversion and Storage

No	Project title	Name of grant funder	Date of conclusion of a contract
1	Innovative matrix materials for molten carbonate fuel cells. BILATERAL COOPERATION POLAND TAIWAN	The National Centre for Research and Development	27-12-2017
2	Novel molten carbonate/ceramic composite materials for sustainable Energy technologies with CO2 capture and utilization. M.ERA-NET 2016	The National Centre for Research and Development	19-04-2016

#### Indicator: Staff Policy Openness (U)

Value as of 31 December 2018 (generated automatically from POL-on system)	Value as of 31 December 2025
10,06	12,00

#### Indicator: Student-to-Staff Ratio (U)

Value as of 31 December 2018 (generated automatically from POL-on system)	Value as of 31 December 2025
11,56	10,00

## OPTIONAL INDICATORS

### Indicator: % of International Staff (U)

Value as of 31 December 2018 (generated automatically from POL-on system)	Value as of 31 December 2025
1,23	2,05

### Indicator:% of International Doctoral Students (U)

Value as of 31 December 2018 (generated automatically from POL-on system)	Value as of 31 December 2025
3,23	11,20

### Indicator: Doctoral Students' Articles in Q1 Journals (U)

Average of values for each year in the period 2020-2024
0,25

### Indicator: % of International Students (U)

Value as of 31 December 2018 (generated automatically from POL-on system)	Value as of 31 December 2025
7,27	12,00

### Indicator: Number of inventions protected by foreign patents (U)

Value for the period 2014-2018	Value for the period 2021-2025
5	25



## A list of inventions protected by foreign patents granted for the first time in the period 2014-2018

A list of the most important inventions implemented for the first time in years 2014–2018 protected by foreign patents granted to the university (up to 5 implementations)					
No	Title of invention	First and last name of an inventor	Patent ID	Name of grantor	Date of patenting
1	Method for purification of ammonia, mixtures of nitrogen and hydrogen, or nitrogen, hydrogen and ammonia	Raróg-Pilecka Wioletta Podsiadło Sławomir Lenkiewicz Dariusz Maculewicz Sławomir	EP2858949	EPO	2018
2	Method for preparation of 5-alkylsalicylaldoximes and application thereof	Bujnowski Krzysztof Synoradzki Ludwik Wisialski Jerzy Królikowska Agnieszka Bordziłowski Jacek Koziorowski Marcin Zadrozny Roman Jerzak Anna Dzienis Krzysztof	EP3265441	EPO	2017
3	A method of nanocrystalline structure formation in commercial bearing	Jeziarska Elżbieta Dworecka Julita Roźniatowski Krzysztof Świątnicki Wiesław	WO2016028174	WIPO	2016
4	Connection system of wheelsets in self-steering railway boogie	Piotrowski Jerzy Matej Jan	EP 2886412	EPO	2015
5	A method for preparing microporous MOF materials	Lewiński Janusz Zbigniew Prochowicz Daniel Sokołowski Kamil	WO2014054955	WIPO	2014

### Indicator: Revenues from commercialisation (U)

Reference years for base values						Reference years for target values
2013	2014	2015	2016	2017	Value for the period 2013–2017	Value for the period 2020–2024
796 400	196 100	279 589	114 726	167 156	1 553 971	4 500 000,00

### Indicator: Foreign accreditations (U)

Number of accreditations as of the date of application submission	Number as of 31 December 2025
9	20

List of accreditations			
No	Name of accreditation institution	Date when accreditation has been granted	Fields of study
1	Accreditation Commission of Universities of Technology	2019-04-25	Biotechnology
2	Accreditation Commission of Universities of Technology	2019-02-28	Chemical Technology
3	Accreditation Commission of Universities of Technology	2016-10-21	Transport
4	Accreditation Commission of Universities of Technology	2015-06-13	Environmental Engineering
5	Accreditation Commission of Universities of Technology	2018-02-15	Computer Science
6	Accreditation Commission of Universities of Technology	2018-02-15	Chemical and Process Engineering
7	Accreditation Commission of Universities of Technology	2018-06-18	Material Engineering
8	Accreditation Commission of Universities of Technology	2019-01-28	Automatic Control and Robotics
9	Accreditation Commission of Universities of Technology	2019-01-28	Power Engineering

## INDICATORS DETERMINED BY A UNIVERSITY

No.	Indicator title	Reference years for base values	Reference years for target values
1.	Percentage of key organizational units aligned with the requirements of POB.	31.12.2018	2022 - 2025
	Additional information	Percentage of organizational units that were aligned with the targets of the Research University. <b>Set annually:</b> <b>a) base value: 31.12.2018 - 0.0 %;</b> <b>b) value 2022: 30%;</b> <b>c) target value 2025: 75%.</b>	
2.	Percentage of covering critical university activities with process management.	31.12.2018	2022 - 2025
	Additional information	Annual indicator, calculated in reference to the report created in the first year of the project. List of critical activities will be determined in the first year of the project. <b>a) base value: 31.12.2018 - 0.0 %;</b> <b>b) value 2022: 30%;</b> <b>c) target value 2025: 75%</b>	
3.	Percentage of employees for whom individual goals are defined in relation to the hierarchy of strategic goals.	31.12.2018	2022 - 2025
	Additional information	The percentage of all employees who have set individual goals. Calculated every year: <b>a) base value: 31.12.2018 - 0.0%;</b> <b>b) value 2022: 30%;</b> <b>c) target value 2025: 70%.</b>	
4.	Number of persons participating in the program for the development of research leaders and early stage researcher's mentoring, especially new employees and doctoral candidates.	31.12.2018	31.12.2025
	Additional information	<b>Base value: 31.12.2018 – 0.0;</b> <b>Target value: 31.12.2025 – 200 persons.</b>	

5.	Assessment of mutual satisfaction in relations between academics and administration employees..	31.12.2018	2022 - 2025
	Additional information	In the first year of the project, the methodology for measuring the satisfaction of cooperation between the various groups of employees at the university will be determined. This value will be monitored every year, <b>with a planned increase of 10%</b> .	