

# **RESEARCH, DEVELOPMENT, AND INNOVATION STRATEGY OF THE WEST UNIVERSITY OF TIMISOARA FOR 2021-2027**

<b>Developed /Modified:</b>	Prof. Florin Alin Sava, PhD Vice-Rector responsible for research strategy, development, innovation, artistic creation and athletic performance
<b>Verified:</b>	HR Director: Bogdan Aldea
<b>Legal opinion:</b>	Legal advisor: Nadia Topai
<b>Endorsed:</b>	Scientific Council for Academic Research and Creativity (CSCCU)
<b>Endorsed:</b>	WUT Board of Directors
<b>Approved:</b>	WUT Senate
<i>First edition</i>	
<i>Effective on <u>  </u>.01.2022</i>	
<i>Withdrawn on .....</i>	

## 1. Introduction

West University of Timisoara (WUT) is the most important and representative higher education institution in the west of the country and one of the most dynamic and important universities in Romania. The WUT promotes both fundamental research (advancement of knowledge) and applied research (solutions for today's societal problems in line with regional or national priorities). The research strategy is convergent with the WUT's mission of advanced research and education, which implies alignment with international academic performance practices and standards.

The present strategy is integrated in a congruent manner with the following strategic research documents and programs: a) Horizon Europe Program (2021-2027); b) National Recovery and Resilience Plan (PNRR); c) National Strategy for Research, Development and Innovation 2021-2027 (SNCDI); d) National Strategy for Smart Specialization 2021-2027 (SNSI); e) Regional Strategy for Smart Specialization (SRSI West RDA); f) National Strategy for Research, Innovation and Smart Specialization 2030. This compatibility will help WUT to capitalize on research results in an optimized way, taking into account the current existing ecosystem.

\* (c) and (d) can be seen synergistically as part of the National Strategy for Research, Innovation and Smart Specialization (SNCSI)

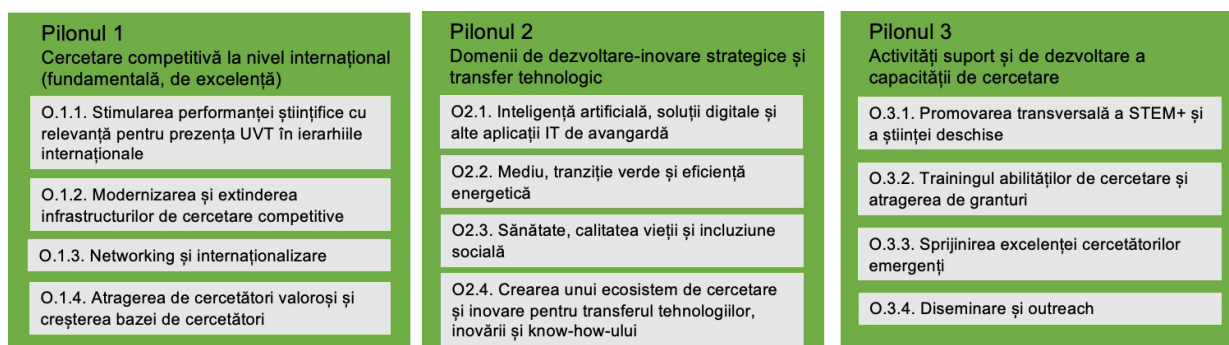


Figure 1. Basic pillars of the WUT research strategy. An overview

The positioning of WUT towards research-development-innovation is explicitly mentioned in the WUT Charter, through the general mission - advanced scientific research and education.

The vision we propose for 2021-2027 involves three main pillars or axes:

- Stimulating WUT's **fundamental research**, internationally relevant research results, in a way that indirectly leads to WUT's access and/or maintenance in the top 5 nationally and top 1000 internationally, respectively, in terms of research; all WUT's fields of science are included in this pillar, with visible research performance and impact at international level being the only possible criterion for differentiation.
- Stimulating **technology transfer, know-how and innovation** in three strategic priority areas (IT and digital; environment; health), through research programs in the fields of smart specialization and in the European Commission's priority innovation areas, in line with existing regional and national priorities.
- Improving **support services for research activity**, through research education and training services, cross-cutting promotion of STEM, stimulating impact publications by PhD students and postdocs, and intensifying the promotion of WUT members' research results in the media and social media.

Four strategic objectives correspond to each pillar (axis). For each axis a SWOT analysis is carried out reflecting the specificity of the pillar.

**PILLAR 1.**
**Objective 1.1 Stimulating scientific performance of international relevance**

**Background.** WUT ranks 4th at the national level in the latest University Meta-Ranking (2021 edition), which summarizes the presence of Romanian universities in 11 international rankings, according to a methodology approved by the Ministry of National Education. WUT's performance in this meta-ranking is appreciated. The first three positions are occupied by UBB, UB and UPB, while WUT is ranked 4th in the second cluster of universities, together with UAIC Iași, U Transilvania Brașov and the medical universities of Cluj, Iași and Bucharest. Given the particular specificity of the medical universities, as well as of UT Brasov (includes engineering and medicine fields), UAIC Iași remains the main reporting partner by comparison, together with the other universities in the core of the Universitaria Consortium, which benefit significantly from the advantage of size.

At the international level, the WUT is part of a stagnating or slightly downward trend. This trend is observable at the level of all higher education institutions in Romania, with a decrease in competitiveness compared to the situation in other countries. This has gradually led to the WUT (and the other Romanian universities, with rare exceptions) dropping out of the top 1000 worldwide. WUT was not included in the overall ARWU 1000, CWTS 1000 Leiden or NTU 1000 Taiwan. Instead, in rankings with more than 1000 positions, WUT is a constant presence. WUT is currently ranked +1000 in THE (the last ranking in the top 1000 universities was in the 2018 edition, on positions 801-1000). WUT also ranks +1000 in the QS rankings (last ranking in the top QS 1000 was in the 2018 edition, on positions 801-1000), respectively ranks +1000 in the CWUR rankings (entering 2020, the first edition to include more than 1000 positions in the rankings). WUT ranks the highest in the US News Best Global Universities ranking (ranked 738th worldwide in the 2022 edition) and in the RUR - Round University Ranking (ranked 626th worldwide in the 2021 edition). The WUT ranks among the top 4-5 Romanian universities in most of the rankings, regardless of whether the position is inside or outside the top 1000 universities. The lowest ranking of WUT is in the URAP - University Ranking by Academic Performance (position 2238 in the 2021 edition) and in Scimago (rank 793, position 3009), both rankings being extensive, without taking into account the size of the universities.

**Table 1. Current situation of the WUT in the international meta-rankings**

ARWU 1000	QS 1300	THE 1662	US BG 1750	CWUR 2000	URAP 3000	Scimago 4126	RUR 867	MoSUR 1650	NTU	Leiden
Absent	1001-1200	1200+	738	1162	2238	3009 Rank 793	623	1401-1500	Absent	Absent

The deterioration of the competitiveness of Romanian universities can be explained by multiple causes such as: (a) the low level of funding (Romania allocates the lowest percentage of GDP to research among EU countries); (b) the brain-drain phenomenon; (c) the existence of marginal CNATDCU and CNFIS indicators in several fields of science, which makes only a part of the staff of comprehensive universities contribute to the overall performance of the institution. To these are added local causes, specific to the WUT: (a) lack of activation of an evaluation and incentive system for research results and performance; (b) reduction in the number of tenured teaching staff (about 650 tenured vs. more than 750 tenure holders in the past); (c) the cessation of the activity of some high performing academics due to retirement, particularly in the field of exact sciences; (d) the *top-down vs. bottom-up* imbalance in terms of research incentives (e.g. missed opportunity to stimulate research when setting the minimum teaching norm);

(e) the absence of a catalyst research institute (ICAM will become operational in 2022), whereas such an institute would allow the coordination of actions at institutional level, beyond the research policies of each faculty or department; (f) the formalistic aspect of many existing research centers in the WUT.

**SWOT analysis for axis 1 (competitive research) of the research strategy**

Strengths (S)	Weak points (W)	Opportunities (O)	Threats (T)
<b>1. Organizational structure</b>			
<ol style="list-style-type: none"> <li>1. Reformist and internationalizing vision of the WUT leadership.</li> <li>2. The existence of individual or institutional international collaborations (see the major advantage for the WUT of being part of the CERN network, as well as ESA or Dubna collaborations).</li> <li>3. High share of articles in the Q1 area out of all published articles (44% in 2020 out of all impact factor publications).</li> <li>4. The existence in WUT's portfolio of high-performing fields (physics), fields with growth potential (geography, psychology, economics) or established Web of Science fields (mathematics, computer science, chemistry, biology).</li> <li>5. The ICAM goes live.</li> <li>6. Implementation of a performance evaluation system, approved by the WUT Senate.</li> <li>7. Supporting journals with international scientific potential (see collaboration with Sciendo).</li> <li>8. The existence of a consistent scientific documentation (access to scientific literature) (WUT, part of the ANELIS Plus network).</li> <li>9. Incentive policy for attracting funds (possibilities to get extra income from grants won through salaries, percentage of the director's regie available to the grant director).</li> </ol>	<ol style="list-style-type: none"> <li>1. Low awareness among many academics of the need to change academic practice, in particular to adapt and encourage internationally relevant research results (indicators reflected in international hierarchies).</li> <li>2. Limited organic international collaborations.</li> <li>3. A low number of applications (i.e. funding obtained) in relation to the number of WUT teachers and researchers in national competitions / international, by comparison with universities in the Universitaria consortium and with some universities in Timișoara.</li> <li>4. High conservatism within some WUT academic departments to bring in staff from outside the WUT (other than <i>entry-level</i> positions).</li> <li>5. A low number of researchers/teachers in established basic research fields such as chemistry, biology, physics or mathematics.</li> <li>6. Low correlation of curricula in many science fields with the development needs in the area of scientific research</li> <li>7. The gap between formal documents and managerial practices in faculties and departments.</li> </ol>	<ol style="list-style-type: none"> <li>1. The existence of a positive annual balance for the WUT, which allows the attraction of new teaching and research staff, as well as the consistent rewarding of top performing researchers.</li> <li>2. The existence of European consortia (in our case UNITA membership), which facilitates international scientific collaborations.</li> <li>3. The paradigm shift in the area of large publishers, from institutional subscription revenues for the journals in their portfolio to open access article processing fees. This shift has been associated in some cases, such as mega-journals with thousands of publications per year, with a significant increase in the volume of articles accepted, as a result of the change in editorial policy - to look for the correctness of the scientific approach and less for the innovative/impact element of the contribution.</li> <li>4. The existence of several international consortia and institutions (ESA, EGI, CLARIN, etc.) that can contribute to increasing collaborations and thus to the visibility, quality and number of published articles and to capitalizing on the university's capacity to integrate into such research and innovation networks.</li> <li>5. The existence of INCDS and branches of the Romanian Academy in Timișoara, with highly qualified human resources.</li> </ol>	<ol style="list-style-type: none"> <li>1. Heterogeneous CNATDCU criteria, some irrelevant for international ranking indicators, in fields strongly represented in the WUT (humanities, vocational fields, some social sciences).</li> <li>2. NCFIS indicators insufficiently anchored to international rankings.</li> <li>3. The increasingly widespread practice in Romanian universities to publish in publishing houses with a questionable editorial strategy, such as MDPI, which artificially changes the gap between universities.</li> <li>4. Some rankings are based on absolute values, which favor large universities (there are several universities in Romania that are 2 to 3 times larger than WUT).</li> <li>5. Unorthodox competitive HR practices practiced in some universities.</li> <li>6. Non-competitive salary thresholds for several fields of science, making it difficult to select young/entry-level staff.</li> <li>7. National priority funding for technological fields, minority fields within the WUT.</li> <li>8. Unpredictable calendar of some competitions organized by UEFISCDI (including their absence in some years), which affects the viability of some research teams.</li> <li>9. A fierce competition to attract quality human resources, despite a much lower territorial mobility of the workforce compared to the Anglo-Saxon environment, which makes it more difficult to transfer from other university centers.</li> <li>10. Financing from different funds (FDI, FSS) or VP contains multiple restrictions on capital expenditure / investment in research infrastructure.</li> </ol>

**Targets for 2021-2027**
**1. WUT included in the top 1000 universities internationally**

(in at least one more major ranking - ARWU, QS or THE - and maintaining position in the US News top 1000)

**2. Keeping WUT's physical sciences in the top 500 at top 500 level**

(according to the ARWU, THE or QS classification by field of science)

### 3. Inclusion of a second WUT field in the top 500 at international level

(according to the ARWU, THE or QS classification by field of science)

### 4. WUT in the top five national rankings

(according to the annual metaranking conducted under the aegis of the Ministry of Education and/or Ad Astra)

### 5. Ranking each WUT science field in the top 3 nationally

(according to the ARWU methodology by fields of science and, where applicable, to the results provided by CNFIS, only for fields of science with at least 10 holders in the WUT and having at least one undergraduate degree program in portfolio)

## Performance indicators for O1.1 (boosting scientific performance)

1.1. An average annual increase of 5% in Web of Science / Scopus indexed scientific output (article or review publications from WoS databases - SCIE, SSCI, AHCI, ESCI, ESCI, Scopus, respectively).

1.2. An average annual 5% increase in the number of publications in WoS Q1 journals (article or review publications from WoS - SCIE or SSCI, in the red zone, according to the impact factor).

1.3. +60% publications in WoS Q1 or Q2 journals out of total WoS publications with WUT affiliation (annual, percentage of article or review publications in Q1/ Q2 journals out of total WoS indexed article/review publications).

1.4. Above-average international impact of WUT-affiliated publications (annually, the CNCI value in WoS for article/review publications is overunitary, indicating above average citations).

1.5. Five WUT journals indexed in Web of Science and/or Scopus by 2027 (all WoS databases are considered - SCIE, SSCI, AHCI, ESCI, ESCI, Scopus respectively).

1.6. The percentage of growth in scientific output in the WUT's fields of science is at least equal to the percentage of growth of competing universities (UAIC, UBB, UB)

(analysis performed on each field of study according to the ARWU methodology, respectively the CNFIS methodology).

For all indicators, reporting is against the average of three previous years (e.g. for performance in 2021 against the average achieved in 2018, 2019 and 2020; in 2022 against the average achieved for performance in 2019, 2020 and 2021, etc.).

## Benchmarks used to compare WUT performance in 2021

	2018	2019	2020	Average
Number of publications (article or review) with WUT affiliation (at least one author) in Web of Science (SCIE, SSCI, AHCI, ESCI) Source: InCites (Clarivate)	316	369	365	350
Number of publications (article or review) with WUT affiliation (at least one author) in Web of Science, impact factor journals (SCIE, SSCI) Source: InCites (Clarivate)	261	304	283	283
Number of publications (article or review) in Q1 (red zone) or Q2 (yellow zone) journals Source: InCites or Web of Science (Clarivate)	197	223	222	214
Number of publications (article or review) in journals in Q1 (red) Source: InCites or Web of Science (Clarivate)	118	137	131	129
Proportion of articles (article or review) from Q1 or Q2 of all publications (article or review type) indexed in Web of Science, with WUT affiliation Source: InCites or Web of Science (Clarivate)	197/316 (62,3%)	223/369 (60,4%)	222/365 (60,8%)	61,1%
Average impact of WUT - CNCI publications Source: InCites (Clarivate)	1,41	1,19	1,23	1,27
Number of publications (article or review) with WUT affiliation (at least one author) in Scopus Source: Scopus	371	404	424	400
WUT journals indexed Web of Science and/or Scopus Source: Internal statistics (DCSCU)	2	3	4	3

\* Data for I1.6 (ARWU methodology) is provided annually with the support of DCSCU and will be available for consultation from 2021.



**(Core) measures and instruments to achieve targets / indicators**

- Incentives foreseen in the Methodology for the annual evaluation of individual professional results and performance (under implementation, annually).
- Incentives under the Framework Methodology on tiered pay (implemented, annually).
- Incentives foreseen in the Methodology for the awarding of merit bonuses (implemented, annually).
- Revision of the competition methodology for vacant teaching and research positions, i.e. the implementation of a methodology for promotion to a position based exclusively on performance (in 2022 or 2023).
- Subsidization of open access publications, indexed Web of Science and falling in the Q1 (red) or Q2 (yellow) zone of the WUT VP or other special funds such as FDI or FSS (implemented, annually).
- Implementation of a WUT journal subsidy procedure to support WUT journals indexed in Web of Science and/or Scopus, while phasing out institutional support for journals that fail to achieve eligible indexing by the end of 2024 (these journals will be able to be supported from faculty funds). For humanities and law, ERIH Plus indexed journals will also be supported, as long as this database is taken into account by CNFIS (in 2022).
- Annual assessment of the performance of the science fields according to the ARWU methodology for monitoring the progress of each WUT science field, i.e. closing the gap with the top-ranked universities in the respective science field, as appropriate.
- Funding of a limited number of applications (internal grants) under the national Young Investigator (TE or DP) category as well as under the Horizon Europe ERC international grants (young or experienced researchers), after a prior procedure on eligibility criteria and within the limit of an available budget. The funding is of limited duration (maximum one year) and is intended to maintain the viability of the research team or researcher in the event of failure to attract funding, despite very high scientific performance.
- Stimulating research capacity at the level of: (a) performing research centers; (b) interdisciplinary research centers, by giving priority to financial support for upgrading infrastructure and attracting outside expertise.

**Objective 1.2 Expanding the WUT research infrastructure and attracting funds for research activity**

**Background.** During 2022, the WUT will benefit from a significant achievement in terms of research infrastructure development: the effective commissioning of the Institute for Advanced Environmental Research (ICAM). This will be the most important achievement of the West University of Timisoara in terms of research investment in the last 20 years. The investment in ICAM includes: (a) the purchase of internationally competitive equipment and (b) the hiring of full-time tenured research staff. The activation of a centrally commanded research structure confers other advantages. By not being administratively dependent on the tutelage of a specific faculty, ICAM benefits from: (a) reduced decision-making time; (b) coherent implementation of WUT research policies; (c) ability to attract competitive human resources, complementary to those attracted by the faculties, in particular through the research facilities available.

The WUT has not made any proposals for large research infrastructures as part of the process of updating the National Roadmap for Large Research Infrastructures 2017-2025, but

this does not prevent access to other available funding lines. Regional opportunities may arise through funding programs managed by West RDA. In the context that ICAM covers only part of WUT's science areas, being focused on environment - green transition - energy efficiency and partly on IT, WUT will take steps towards a second major research infrastructure. Expanding and strengthening the infrastructure is a goal that is more dependent on external factors and funding opportunities. Therefore, depending on the identified funding opportunities, the investment may aim at boosting the application area in the other strategic application directions of the WUT - IT and health, in a stand-alone manner or within a research hub at the level of the Timisoara University Alliance (ATU). An alternative would be to develop the infrastructure and attract expertise in the area of basic research, taking advantage of opportunities such as the connection with ELI-NP and the possibility of collaboration with a second CERN experiment outside Atlas, as well as the existing high expertise in certain science areas such as materials science, which will contribute to strengthening the STEM science programs.

Independent of and complementary to the investment objectives described above, there will be: (a) some one-off investments in equipment to provide a national competitive advantage, and (b) better exploitation of the research infrastructure already in place at ATU universities. We will also continue to provide support to (i) maintain existing equipment and (ii) modernize existing equipment or software through upgrades.

Quality research needs not only equipment, software or consumables, but also access to the literature. Therefore, we will continue to prioritize access to databases (journals) and extend this access to other databases not included in the ANELIS Plus consortia offer.

Part of the investment in infrastructure (equipment, software, etc.) can be made through research grants, as they benefit from a favorable legislative framework compared to funding from other sources. Grants not only facilitate such purchases, but also offer the possibility to hire human resources for research activities, boosting scientific research in the WUT. Therefore, a priority under O1.2 is to stimulate the application for research grants and to incentivize the inclusion of capital expenditure in the grants obtained. One problem identified is that most grant applications are submitted in national competitions, with little exploration of the route of attracting funds in international competitions. We will aim to increase the share of applications in Horizon Europe competitions out of the total applications submitted.

### **Targets for 2021-2027**

#### **1. Starting construction on a second major research heritage objective**

*(through an independent infrastructure project or in cooperation under the ATU)*

#### **2. Significant increase in income from research grants**

*(considering PNCDI and Horizon 2020 / Europe programs)*

### **Performance indicators for O1.2**

1. Investment completed and ICAM operational *(by 2023)*.
2. Start construction on the ATU research hub or other major capital investment or at least 2 competitive facilities (other than ICAM), giving WUT a strategic advantage for WUT in competition with other regional or national partners *(by 2024)*.
3. 3% increase in upgrade/maintenance costs for hardware and software

(annual, compared with the average of the last three years, minimum percentage, including software subscription services)

4. Increasing the number of databases accessed through the WUT

(before 2025, at least 3 new databases, while maintaining existing ones)

5. 5% increase in the total number of accesses to databases purchased by the WUT

(annually, compared with the average of the last three years, minimum percentage)

6. 5% increase in the number of applications submitted in national competitions (PNCDI)

(annually, compared to the average of the last three years of PNCDI, minimum percentage)

7. 10% increase in the number of grant projects submitted in international competitions (Horizon Europe)

(annually, compared to the average of the last three years - Horizon 2020, minimum percentage)

8. 5% increase in revenue from research grants won in national competitions

(annually, compared to the average of the last three years of PNCDI, minimum percentage)

9. 10% increase in revenue from research grants won in international competitions

(annually, compared to the average of the last three years - Horizon 2020, minimum percentage)

**Benchmarks used to compare WUT performance in 2021 (for I3-I9)**

	2018	2019	2020	Average
Equipment/software maintenance or upgrade costs, including software subscription services or access to computing resources Source: To be defined	missing info	missing info	missing info	-
Number of databases purchased by WUT through the ANELIS Plus consortium or independently Source: DCSCU via e-nformation and/or other providers	15	14	14	14
Number of database accesses acquired by WUT through the ANELIS Plus consortium or independently Source: ANELIS and/or E-nformation (concatenated internally, DCSCU)	617350	814901	1395608	942620
Number of applications in the competitions managed by UEFISCDI (PCE instruments are monitored; PCCF, ERC-like from P4, TE, PD, PCCDI from P1, BG, PED, PTE, CI, SOL from P2, all P3 and PCC instruments from EEA & Norway Grants) Source: DCSCU (internal statistics)	45	19	18	27
Annual income from grants won in competitions managed by UEFISCDI (see above) Source: DCSCU (internal statistics, via the WUT Economic Department)	4019816	6737934	6848117	5868622
Number of applications in international competitions (all H2020 or Horizon Europe programs) Source: LEAR WUT & SupportTM	21	13	29	21
Annual income from international competitions (all H2020 or Horizon Europe programs are counted) (proportional to the number of months/budget) Source: SupportTM (internal statistics, via the WUT Economic Department)	689874	2603330	2603330	2060272

**(Core) measures and instruments to achieve targets / indicators**

- ICAM project management (including sustainability period) (under implementation).
- Feasibility study carried out and equipment procurement list prepared for a new major capital investment relevant to research (2022 or 2023).



- Application of the WUT to at least one national or European project of the type of development of strategic RDI projects, such as research HUBs / acceleration / technology transfer (until 2025).
- Financing from the research fund (VP) or other special funds (such as IDF) of expenses for the maintenance or upgrade of equipment or software, in compliance with the applicable legal rules (based on an open call and ranking of proposals received on the basis of transparent and explicit criteria) (annual, implemented). Within a limited budget, priority will be given to research centers in areas that contribute significantly to the WUT's research performance such as materials science or astrophysics, based on the annual analysis of the contribution of science areas to the WUT's performance.
- A procedure for access to WUT equipment and software, accompanied by a list of owned equipment on the WUT website (2022) and detailed publication on ERRIS.
- WUT participation in ANELIS Plus consortia to streamline the costs associated with access to international databases (at the end of ANELIS Plus), not only access to specialized literature.
- Supplementing access to other databases such as those specific to a particular field of science, based on the scientific performance of the field under analysis and the level of access to that database (in the case of databases already funded) (annual, review).
- Autonomy given to the grant manager on how to spend the project royalty, with flexibility in the percentage of the royalty depending on the share of capital expenditure (e.g. 75% for capital expenditure above 25% of the post-computation estimate or for projects won through international competition vs. 25% for grants without capital expenditure included) (from 2023).
- Stimulating the inclusion of capital expenditure in grants obtained through other measures, such as differentiating the percentage of overheads claimed by the WUT depending on team structure and expenditure (under consideration from 2023).
- Incentives in the Framework Methodology for tiered pay for grant applications (with encouragement for applications in international competitions).
- The current activities of the Support Center™ (for Horizon Europe), DCSCU (for PNCDI) and the planned WUT Technology Transfer Center (for the innovation and technology transfer components) to provide information and training on funding opportunities and develop project writing skills, as well as clearer communication on the WUT website of the roles of these entities and the forms of support provided to researchers.
- Introducing administrative support in technical aspects of the project (budget building, possible impact).
- Reducing administrative burdens for project managers by hiring an expert administrator within the DCSCU to manage special situations in the procurement process for WUT research projects, as well as purchases made from the WUT research fund or other special funds such as IDF or SSF, which are related to research.

### Objective 1.3 Networking and internationalization

**Background.** Excellent research and notable research results are impossible to achieve without stimulating internationalization measures and scientific and professional networking. Just look at what the collaboration with CERN means for the WUT in terms of the number of scientific publications. International collaborations bring more citations, therefore more visibility at international level and are a sign of maturity and

the competitiveness of a research group. Also, mobilities abroad (e.g. research traineeships) often bring research results, contribute to the acquisition of new skills and change mindsets. The existence of the European consortium UNITA, with its many ongoing projects, is an important asset for the WUT in the coming period.

O1.3 also includes measures to increase the image and attractiveness of the WUT, such as taking steps to obtain the European Commission's Human Resources Award for Excellence, following the audit of the WUT research system. Other similar steps, such as auditing for ratings/stars, could be considered to increase the attractiveness of the WUT.

Measures are needed to increase the proportion of foreign teachers and researchers in the WUT staff. If such initiatives are easier to implement in terms of employing researchers, the number of study programs in international languages needs to be increased in the teaching component.

Finally, beyond the internationalization component, national networking measures will also be encouraged, through WUT's membership in RDI clusters and the implementation of some PNRR programs.

### **Targets for 2021-2027**

#### **1. Win the European Commission's Human Resources Award for Excellence**

*(following the audit of WUT research structures and processes)*

#### **2. Increasing the level of internationalization and visibility of WUT research**

*(as a result of an increase in the proportion of foreign staff, the proportion of publications in international collaboration, etc.)*

### **Performance indicators for O1.3**

1. Maintain the number of international strategic research partnerships such as CERN, ESA or Dubna, or increase this number by at least two such as ELI-NP (annually, throughout their lifetime).
2. Maintaining or increasing the number of national research clusters in which the WUT is a member (annually, for the whole period of their activation) and analyzing the WUT's activity within these clusters.
3. Increase by 8% per year the number of research mobilities (not including Erasmus mobilities) carried out by WUT teaching and research staff (in a pandemic context the accepted percentage of increase is 2%).
4. Win the European Commission's Human Resources Award for Excellence
5. Increase by 5% per year the number of full time, fixed-term or permanent full-time foreign national teachers or researchers employed by the WUT.
6. Annually, at least 50% of WUT article or review publications in the Web of Science are international collaborations.

### **Benchmarks used to compare WUT performance in 2021**

	2018	2019	2020	Average
Number of strategic international partnerships <small>Source: DRI WUT (internal statistics by calendar year)</small>	3	3	3	3
Number of CDI clusters in which WUT is a member <small>Source: DCSCU (internal statistics by calendar year)</small>	6	6	6	6
Number of research traineeships abroad* (with a minimum duration of 28 days) <small>Source: DRI WUT (internal statistics by calendar year)</small>	1	3	0	~1
Proportion of international staff (teaching or research) employed full-time by the WUT	4 of 662 0,0060%	4 of 676 0,0059%	4 of 674 0,0059%	~0,006%

(of all teaching and research staff at WUT) Source: WUT DRU (internal statistics, situation as at 01.10 / 31.12 of the year analyzed)				
Percentage of international collaborative publications (WoS article or review publications with at least one author affiliated abroad) Source: InCites (Clarivate)	53.1%	52.6%	49.6%	51.7%

\* The available statistics have been compiled by academic year, taking into account internships longer than 31 days (2017-2018 - for 2018, 2018-2019 for 2019, etc.).

### **(Core) measures and instruments to achieve targets / indicators**

- Covering expenses associated with participation in international and national consortia/clusters.
- Implementation of a 4-week research internship program for young researchers and academics employed full-time at WUT (implementation from 2022).
- Incentives included in the Methodology for annual assessment of individual professional results and performance (with implementation from 2023).
- Extension of incentives in the Framework Methodology on tiered pay (for publications in international collaboration, from 2022, membership of Cost actions, etc.).
- Implementation of activities included in UNITA consortium projects.
- Stimulating *incoming* mobilities for international specialists, through a better use of the implemented *visiting professor / visiting scholar* program, as well as through other punctual (e.g. *guest speaker* etc.) or strategic (e.g. *ERA Chair* or *Endowed Chair*) solutions.

### **Objective 1.4 Attract valuable researchers and increase the pool of researchers**

**Context.** This objective is critical to the success of most of the proposed objectives. O1.4 brings flexibility of action in achieving many of the targets proposed above. For example, a 5% increase in scientific output can be achieved either by increasing the productivity of existing staff by 5% or by maintaining staff productivity at current levels, accompanied by a 5% increase in teaching and research staff. Many international hierarchies do not take into account the size of the university, which gives an advantage to large universities in terms of staff numbers. The WUT has a significant potential to increase the number of tenure-track human resources, considering the significant number of vacant positions in the establishment plans of several faculties and departments. At present, these positions are mainly filled by full professors, which increases the teaching load to the detriment of research. This reinforces the idea that this is a **critical and priority** objective in terms of increasing involvement in research.

The solution is to hire researchers and teachers. Simple as it is, it is difficult to implement because of external and internal barriers to attracting labor. The most important external barrier is the low attractiveness of an academic career in many fields of science with a strong presence in the WUT. In fields such as computer science, law or economics career opportunities outside the university can be significantly more financially attractive, especially for entrants, especially for beginners. In other fields, such as mathematics or philology, positions in pre-university education may be more financially attractive than those in higher education. In addition, Romania faces low labor mobility when decisions involve relocating to another city. Salary levels are significantly less attractive than those offered by universities abroad, which makes it difficult to repatriate diaspora researchers.

In addition, there are a number of internal barriers present in some faculties or departments. Thus, some degree programs neglect the development of research competences in their curricula.

There are programs which, up to the doctoral level, are based on a single discipline in the research area, which cannot ensure sufficient skills for an academic career in research. Non-formal training is insufficient, despite significant changes in science such as the open science area, the reproducibility crisis (see *data management plan, study protocol registration*, etc.), and the policy of retirement of permanent staff at the age of 65, which has led to a decrease in the number of WUT employees, as the number of new entrants into the system is exceeded by the sum of retirements and departures from the system. Finally, there has been opposition to the hiring of experienced staff from certain collectives, and sometimes even opposition to proposed entries into the system. All this has contributed to increased demands on the teaching component, with negative consequences for research.

Complementary to this theme is the fact that in the European context there is increasing talk about the need for universities to adhere to the European Charter for Researchers and the Code for the Recruitment of Researchers, which implies a broad process of developing, implementing and evaluating the action plans of the "Human Resources Strategy for Researchers" (HRS4R), developed by the European Commission. Accession will lead to improved recruitment processes in the WUT and an increase in the attractiveness of a research career in the WUT.

### Targets for 2021-2027

#### 10. Increase the number of academic staff at WUT to a minimum of 800

(at the end of 2027, teachers and researchers in full-time, permanent or permanent positions)

#### 11. Increasing the competitiveness of human resources attracted to the WUT

(+ experienced vs. - beginners; + ntructututurenenl vs. - ntructur; + ntructuturenl vs. - indefinite; + research vs. - didactic; + newcomers vs. - promotions)

#### 12. HR Excellence in Research

(implies adherence to the European Charter for Researchers and the Code for the Recruitment of Researchers by the end of 2022 and implementation of a set of measures needed to achieve the distinction by the end of 2025)

### Performance indicators for O1.4

#### 13. 3% increase in full-time employees at WUT

(average annual growth rate to reach the quantitative target of 800 teachers and researchers in 2027).

#### 14. 5% increase in the share of experienced employees from outside the WUT

(average annual growth rate, the share is the ratio of non-entry level externs employed to the total number of people employed at the WUT in teaching/research positions, following a competition or promotion exam).

#### 15. 5% increase in attractiveness for a university career

(average annual growth rate, the share is the ratio of the number of people employed in a junior position (e.g. research assistant or teaching assistant) to the total number of people employed in the WUT in teaching/research positions, following a competition or promotion exam).

#### 4. Increase by 5% the share of academic staff in the total number of teaching and research appointments

(average annual growth rate, the share is the ratio of the number of teachers and researchers who are not Romanian nationals out of the total number of people employed in teaching or research positions, following a competition or a promotion exam).

#### 5. Recruitment of a minimum of three experienced and top-performing teaching/research staff

(yearly, hiring through academic departments or other WUT research structures).

#### 6. Minimum of eight postdoctoral researchers in the 7structure7e postdoctoral fellowship program

(annual, priority grants for researchers from the diaspora and the best WUT PhD students).

#### 7. Minimum 20 full researchers employed in ICAM / other 7 research structures

(until the end of 2023, with their maintenance until the end of 2027 and beyond).

#### 8. An ERA Chair position at WUT

(by the end of 2026).

## 9. Adhering to the European Charter for Researchers and the Code for the Recruitment of Researchers (by the end of 2022).

### Benchmarks used to compare WUT performance in 2021 (I1 - I7)

	2018	2019	2020	Average
<b>Total teaching and research staff in WUT</b> Source: DRU WUT (situation on 01.10 / 31.12 of the calendar year analyzed), norm full-time fixed-term / permanent contract	662	676	670	~669
teachers (assistant / senior lecturer / associate professor / professor)	640	644	637	~640
researchers (research assistant / CS III / CS II / CS I)	22	32	33	29
Indefinite	640	644	639	641
Fixed period	22	32	31	~28
<b>Total teachers and researchers foreign nationals</b> Source: DRU WUT (situation at 01.10 / 31.12 of the year analyzed, full-time with fixed-term / permanent contract)	4	4	4	4
<b>Total hirings through competition or promotion</b> Source: DRU WUT (as at 01.10 / 31.12 of the calendar year analyzed)	63	63	59	~61
in higher positions (minimum conf./CSII)	20	18	29	~22
WUT external recruitment (non-beginners - senior lecturer/CS III, conf/CS II, prof/CS I)	9	9	3	7
beginners (teaching assistant / research)	19	26	21	22
foreign nationals	0	0	0	0
teachers	56	49	44	~50
researchers	7	14	15	12
Indefinite	44	39	44	~42
Fixed period	19	24	15	~19
<b>Number of postdoctoral research fellowships</b> Source: IOSUD WUT	0	20	0	~7

### (Core) measures and instruments to achieve targets / indicators

- Setting up a research institute along the lines of STAR-UBB or ICUB-UB. This institute is placed outside the academic departments and faculties, similar to ICAM, but covering research areas outside ICAM. The institute will facilitate the implementation of WUT staff attraction policies, in a coherent and complementary manner with the existing faculty and departmental policies (to be implemented in 2022). The institute will also focus WUT research capacities by managing certain centralized programs to allocate resources to WUT researchers and by collaborating directly with WUT active research centers. The Institute will have, in parallel, specific research and knowledge dissemination activities, will operate with its own staff and affiliated researchers, both WUT and external.
- Implementation of an attractive WELCOME package to attract experienced researchers with a track record in research through non-competitive installation grants.
- Implement an attractive package to attract postdoctoral fellows, through an annual competitive postdoctoral fellowship program (under implementation, to be revised, possibly also by accepting virtual residencies at a different spending ceiling).
- Implement an attractive package to attract newcomers to an academic career, through a complementary program of scholarships or integration grants, aiming at professional development with a focus on research skills (to be implemented from 2022).
- Implementation of a similar package for master students (scholarships) and bachelor students or graduates (scholarships and promotion of a full pathway including doctoral studies - 3+5).



- Implement an attractive package to attract researchers through ERA Chair competitions and stimulate the search for researchers willing to apply for ERA Chairs.
- Adherence and implementation of the necessary procedures for the HR Excellence in Research award.
- Including the performance of a field of science as a basic criterion in the decision to support open competitions for vacant teaching or research positions.

## PILLAR 2

While the first pillar of the strategy is particularly relevant to the basic research component and to the competitiveness of human resources in research, the second pillar of the strategy focuses on applied research with results in the field of development-innovation and transfer of solutions and technology to the social-economic environment.

### SWOT analysis for axis 2 (applied research and technology transfer) of the research strategy

Strengths (S)	Weak points (W)	Opportunities (O)	Threats (T)
<b>3. Organizational structure</b>			
1. Existence of in-house researchers interested in research, development and innovation activities. 2. High scientific expertise in areas of smart specialization, meaning high potential for technology transfer. 3. WUT's previous experience in entrepreneurship through projects for student entrepreneurs and grants in partnership with economic actors (e.g. PED). 4. Existence of WUT strategic partners from the social-economic environment (GPS). 5. Competitive research infrastructure (particularly in ICAM), an advantage for innovation and cooperation with the social economic environment.	1. The structure of WUT study programs (absence of engineering fields, a large number of study programs in social sciences and humanities) diminishes WUT's technology transfer potential. 2. Low relevance of incentives for development-innovation activities compared to incentives for a professional career based on publishing scientific articles. 3. The low level of <i>know-how</i> and interest in WUT for the area of innovation entrepreneurship and collaborations with the social-economic environment (and for the area of technology transfer). 4. Weak activity of the Office for Technology Transfer within the DCSCU. 5. The absence of an accredited Technology Transfer Center within the WUT, which affects the WUT's eligibility to access certain sources of funding from the Structural Funds.	1. Membership of the UNITA consortium can facilitate the transfer of <i>know-how</i> and best practices on the components of innovation and innovative entrepreneurship (see InnoUNITA and RE-UNITA). 2. The existence of a large number of funding opportunities (especially structural funds) in the area of technology transfer, innovation and smart specialization areas (at regional, national and European level). 3. Increased congruence between WUT's priority areas of applied research and priorities set at regional, national and European level. 4. High need for innovation within the local and regional economic environment.	1. Risk of migration of WUT experts (existing or trained in the future) to the business environment due to significantly higher financial incentives. 2. The strong link of technical universities with economic partners, which may create a competitive disadvantage for the WUT or a perception disadvantage in the event of competitive <i>calls</i> . 3. The formal aspect of many consultations on the development of local, county, regional or national strategies, which may lead to the setting of priorities that are different from those that effectively link the needs of the business environment with the expertise of the academic environment, which may affect the potential for technology transfer. 4. The imbalance of incentives for basic vs. applied research, leading to ignoring social and technological needs and undervaluing partnerships with industrial partners.

### Objectives 2.1, 2.2 and 2.3. Priority areas for applied research

#### 2.1. Artificial intelligence, digital solutions and other cutting-edge IT applications

#### 2.2. Environment, green transition and energy efficiency

#### 2.3. Health, quality of life and social inclusion

**Background.** Given that: (a) WUT is a comprehensive university with 11 faculties and about 30 fields of science; (b) WUT aims to be a more active player in Horizon Europe than it was in Horizon 2020; (c) WUT aims to make its priorities on the development-innovation and technology transfer component compatible with the priorities set at European, national and regional level for the period 2021-2027 (see PNRR, SNC DI, SNSI and SRSI West RDA, as well as Horizon Europe), three strategic application areas, generically named: (i) IT; (ii) environment/energy; and (iii) health, encompassing the following key strands: (i) Artificial intelligence, digital solutions and other cutting-edge IT applications; (ii) Environment, green transition and energy efficiency; (iii) Health, quality of life and social inclusion.

**Correspondence between WUT priority directions and European/national/regional priorities**

<b>Priority directions in the WUT</b>	<b>Artificial Intelligence, digital solutions and other IT applications by avant-garde</b>	<b>Environment, green transition and energy efficiency</b>	<b>Health, quality of life and social inclusion</b>
Strategic Research Agenda SNCDI 2021-2027 (National Strategy for Research-Development-Innovation) / Horizon Europe Program	Digitization, industry, space	Climate, energy and mobility / Food, bio-economy, natural resources, agriculture and environment	Health / Culture, creativity and inclusive society
NRRP (National Recovery and Resilience Plan)	Pillar 2: Digital transformation	Pillar 1: Green Transition with the 6 components (e.g. energy etc.)	Pillar 5: Health, economic, social and institutional resilience with the 3 components (e.g. health)
SNSI (National Smart Specialization Strategy)	Digital economy and space technologies	Energy and mobility / Environment and eco-technologies	Health - advanced prevention, diagnosis and treatment
SRSI ADR West (Regional Smart Specialization Strategy for the West Region)	ICT and automotive	Energy efficiency and sustainable construction (buildings)	Health and quality of life

In support of the three strategic directions, there are strong research structures such as the e-Austria Institute Timisoara (for the ICT direction) or the Institute for Advanced Environmental Research - ICAM (for the environment/energy direction). In addition, they are also supported by joint research teams, resulting from international collaborations within the UNITA Consortium, such as the Renewable Energy and Circular Economy themes (for the Environment strategic direction / energy) and (digitization) of cultural heritage (for the IT strategic direction).

**Targets for 2021-2027**

1. Investment in research infrastructure and human resources in priority application areas
2. Strengthening partnerships with the socio-economic environment in the area of applied research  
(by offering innovative solutions and services for problems related to WUT's priority application areas, as well as by offering scientific research and consultancy services on specific topics targeted by the socio-economic environment)

**Performance indicators for O2.1, O2.2 and O2.3**

1. Increase by 5% per year the WUT's income from partnerships with the social-economic environment (annual average growth rate).
2. Increase by 5% per year the share of WoS publications in socio-economic collaboration (annually, publications with at least one co-author with affiliation outside INCs or universities).
3. Increase by a minimum of 5% per year the number of applications submitted in national competitions for projects under PNCDI - Pillar II (e.g. PED grants, Solutions, etc.) or international Horizon Europe Pillar III.
4. Minimum 3 annual contracts for research / innovative services, preferably one in each application area, preferably attracted from private non-competitive or structural funds.
5. Minimum 1 internal research grant awarded to mature innovative solutions (yearly).
6. Minimum 4 national patent applications and minimum 2 granted patents (by the end of 2026).

**Benchmarks used to compare WUT performance in 2021 (I1 - I3)**

	2018	2019	2020	Average
Revenue from research contracts / services rendered to third parties <small>Source: DCSCU (internal statistics, via the WUT Economic Department)</small>	2068711	1248002	1458397	~1591703
Percentage of Web of Science article or review publications with at least one author affiliated to a non-academic organization (other than universities or research institutes) <small>Source: InCites (Clarivate)</small>	0 of 316 0,00%	2 of 369 0,54%	0 out of 365 0,00%	0,18%
Number of project applications submitted (successfully) in PNCDI Pillar 2 competitions (Increasing the competitiveness of the Romanian economy through RDI) <small>Source: DCSCU (internal statistics)</small>	0 (0)	21(5)	17(0)	~ 13(2)
Number of (successful) project applications submitted to Horizon Europe Pillar 3 (Innovative Europe) competitions <small>Source: SupportTM (internal statistics)</small>	1 (0)	1 (0)	1 (0)	1 (0)

**(Core) measures and instruments to achieve targets / indicators**

- To equip a minimum of two *state of the art* laboratories in IT and health, following the model of the ICAM laboratories (deadline: end of 2024 and 2025).
- Annual funding of a minimum of two research grants from the WUT VP, the results of which aim to reach TRL level 4 as a minimum level (preferably TRL 6, prototype validation), in the WUT priority application areas, as an incentive to advance solutions (reaching mature TRL stages) in the WUT priority application areas.
- Award between 3 and 5 vouchers annually to WUT laboratories and research centers that demonstrate the provision of services to the private sector (e.g. by providing access to testing or experimentation services to SMEs) or by engaging in public-private partnerships through research expertise / services in the areas of smart specialization.
- Investing in research infrastructure and human resources involved in research areas / offering expertise against cost to economic operators. The model currently implemented through services / expertise in Archaeology should be multiplied.
- Annual organization of at least 2 *open day* type events in order to identify partners from the socio-economic environment, respectively to inform about funding opportunities and conditions in the area of development-innovation.
- An annual training session on the stages of product/service development (TRL) and other elements specific to industry partnerships.
- A minimum of 40 full researchers, including ICAM, to be employed, carrying out research in one of the three WUT priority areas of applied research (by the end of 2025).
- Intensification of international partnerships in the targeted priority areas, capitalizing on the network and opportunities offered by membership of the UNITA Consortium, through at least one international collaboration in each priority area.

**Objective 2.4. Creating a research and innovation ecosystem for the transfer of technologies, innovation and know-how**

**Background.** If objectives 2.1-2.3 aim primarily at stimulating applied research with potential for valorization in the social-economic environment in the three priority areas of the WUT research strategy, O 2.4 is a transversal objective, facilitating the development-innovation activity, whether or not it falls within a priority applied field, aimed at

especially support activities, implemented through an accredited Technology Transfer Center at WUT level.

### Target 2021-2027

1. WUT, the main academic actor in the Western region of the country in the field of CDI activities (through the implementation of a set of best practices and support activities for RDI and innovation entrepreneurship)

#### Performance indicators for O2.4

1. Periodic authorization and accreditation of a WUT Technology Transfer Centre (authorization in 2022, accreditation in 2023).
2. WUT Digital & Green Living Lab joining the European Network of Living Labs (in 2022).
3. Positive and growing annual financial results for the WUT Technology Transfer Center (and possible spin-off spin-off companies).
4. Intensive training of minimum 3 experts from the Technology Transfer Center in innovation entrepreneurship (continuous).
5. Annual training of at least 15 WUT teachers and researchers active or interested in the field of development-innovation.
6. At least 3 persons employed in the WUT benefiting from individual income from the exploitation of intellectual property rights as a result of innovation activities carried out by the WUT (by 2027).

#### (Core) measures and instruments to achieve targets / indicators

- Submission of documentation for provisional authorization and accreditation of the WUT Technology Transfer Center (2022, 2023).
- Develop and provide framework documents and model procedures necessary for the contracting process of the services offered by the Technology Transfer Center (2022, 2023).
- Submission of the WUT Digital & Green Living Lab recognition application to the European Commission (2021).
- Specific training of staff to be employed in the WUT CTT in the field of RDI (continuous).
- Providing specific support to WUT research teams involved in business collaborations (business plan, market studies, needs analysis, IPR consultancy, etc.) (continuous).
- Annual implementation of courses in innovation entrepreneurship (e.g. product launch, practices in the start-up area such as *crowdfunding*, *business angel*, related legislation).
- Providing financial incentives to participants in such training activities.
- Revision of the methodology for the distribution of income generated based on intellectual property generated within the WUT.
- Stimulating partnerships between the WUT and the economic environment in order to implement (continuous) RDI activities and networking of experienced professionals in the innovation area, including through instruments such as the EIT HEI Initiative.
- To reinvigorate and expand the WUT - Center for Innovation and Entrepreneurship SRL in the field of business and management consultancy services and to attract WUT staff to its work.
- Involve business representatives in an advisory role in the development and implementation of research strategies at faculty or departmental level.

**PILLAR 3**

The third major component of the WUT research strategy brings together the support activities for the development of research capacity, in particular among young human resources, for the integration of new WUT employees, the attraction of qualified human resources, in particular in STEM fields of science.

SWOT analysis for Axis 3 (activities supporting the development of research competences and competitiveness of WUT researchers)

Strengths (S)	Weak points (W)	Opportunities (O)	Threats (T)
<b>4.Organizational structure</b>			
<p>1. Positive image of the WUT brand for teachers and researchers.</p> <p>2. Poles of scientific excellence that can provide mentoring and support.</p> <p>3. Existence of support departments (DCSCU, SupportTM, DAIP, CTT-WUT) with a support role for WUT researchers.</p> <p>4. Competitive research infrastructure (particularly in ICAM) is an incentive to attract researchers.</p> <p>5. The existence of a large number of PhD supervisors, which, in theory, may contribute to better supervision of doctoral students by reducing the number of doctoral students supervised simultaneously.</p> <p>6. <i>Know-how</i> on open innovation in the Living Lab system.</p>	<p>1. A human resources policy focused on promoting and retaining departmental members and less on hiring competitive external human resources.</p> <p>2. Lack of research skills training in some degree programs (including low number of research master programs)</p> <p>3. Under-resourcing of human resources in scientific fields with STEM research potential, such as biology and chemistry.</p> <p>4. Low number of research grant applications submitted by WUT staff, reflecting low motivation or ability to attract funding.</p> <p>5. Low utilization of PhD students in scientific production with international relevance, under the affiliation of WUT.</p> <p>6. The low interest of staff in certain fields of science in the prospect of developing research skills, citing the priority of teaching activities.</p> <p>7. The high teaching and/or administrative load of many colleagues leaves less time for research.</p>	<p>1. The restructuring of research practices in most scientific fields (open science, pre-registration, etc.) represents a need for genuine training and retraining.</p> <p>2. The start of a new program cycle (Horizon Europe, SNSCI), the introduction of other new funding opportunities (e.g. support for innovation through West RDA) requires adequate training in terms of awareness of concrete existing opportunities.</p> <p>3. Focusing the interest of funders on communicating research results to the general public, not just on disseminating results to the scientific community.</p> <p>4. The heterogeneity of science fields and the high potential for inter- and trans-disciplinary collaboration.</p> <p>5. The open support for bringing in competitive (mature) human resources and the significant number of vacant positions available are the ideal combination to hire new staff (increase the number of employees) and to stimulate skills training and performance of existing staff.</p>	<p>1. Low level of salary competitiveness, particularly for entry-level cases, compared to the non-academic environment in a number of science fields (law, computer science, economics, etc.).</p> <p>2. The formal aspect of some training based on ticking components in exchange for extrinsic (financial) incentives (training for certificates, not real skills training).</p> <p>3. Low level of employee expertise on the development-innovation component.</p> <p>4. Strong competition for funding (low funding rate, unpredictable timetable), which can affect motivation to write and submit research projects.</p>



### Objective 3.1 Cross-cutting promotion of STEM+ and open science Objective 3.2 Research skills training and grant attraction Objective 3.3 Supporting excellence of emerging researchers (MSc, PhD)

**Background.** Scientific domains contribute unequally to internationally visible research results. For example, chemistry, physics and biology are science fields covering more than 60% of the national output of Web of Science indexed scientific articles. Biology and chemistry are under-resourced within the WUT. Together they contribute to less than one fifth of the total scientific output of the WUT, whereas the two fields contribute to one third of the total national scientific output. Toward stimulating STEM fields of science, we will encourage interdisciplinary collaborations that include at least one STEM perspective. In this regard, particular attention will also be paid to computer science as a cross-cutting science field in an era of digitization.

Another problem identified is the heterogeneous level of skills to carry out research in an internationally competitive manner, i.e. to align with new practices required in the sciences. Subjects such as open science, reproducibility crisis, *outreach* component have changed practices in many fields of science, which requires additional training. Also, early routes need to be developed to attract good undergraduate and master students into research activities and to develop advanced research skills. Last but not least, the relatively low level of applications for research grants may also be due to a lack of awareness of the competitions available from PNCDI, Horizon Europe or as a result of low confidence in the ability to attract such funds.

All these issues, and others not mentioned here, can be addressed or improved by: (1) professional development measures and (2) the development of such competences at master and/or doctoral level.

In addition, there is the need to reform the area of doctoral studies, through a higher valorization of doctoral studies, doctoral studies in STEM fields and the establishment of minimum thresholds for the publications required for graduation, which should be harmonized with institutional needs, not only with those established at national level, through the CNATDCU standards.

#### Targets for 2021-2027

##### 1. Increasing the share of STEM teachers and researchers

*(out of all full professors, full-time researchers).*

##### 2. Consistent increase in the number of research grant applications and revenues attracted

*(compared to 2014-2020, an increase of at least 40% in the number of applications and at least 20% in revenues attracted from national and international competitions; this cross-cutting target also appears in O1.2, in terms of incentives/motivation measures; here, in terms of skills development measures).*

#### Performance indicators for O3.1, O3.2 and O3.3

1. Increase the number of teachers and researchers employed in STEM (biology, chemistry, physics, physics, mathematics, computer science, earth sciences) fields by an average of 10% per year
2. At least one funded annual interdisciplinary collaboration with internal or external WUT partners, with at least one member from FF, FCBG or FMI science fields and at least one other member from faculties outside the STEM core.
3. Minimum of 15 teachers and researchers benefiting annually from the program of integration and professional development courses, with a focus on the development of research competence.
4. Minimum 15 scholarships offered annually for internship activities to students and/or master students with research potential.

5. Initiation by October 2025 of at least two new research master's degrees and maintenance of existing research master's degrees, including through the provision of special budget places.
6. Increase the number of internationally visible research results (Web of Science and Scopus) produced by doctoral students by an average of 10% per year.
7. At least four training course materials developed by the beginning of the academic year 2023-2024, of which one on familiarization with the structure of PNCDI and Horizon Europe and one on grant application writing.
8. Increase the number of grant applications submitted in PNCDI and Horizon Europe grant competitions by an average of 5% per year.

#### *Benchmarks* used to compare WUT performance in 2021

	2018	2019	2020	Average
Total tenured STEM teachers and researchers in WUT Source: DRU WUT (situation on 01.10 / 31.12 of the calendar year analyzed), Full-time fixed-term / permanent contract IMF, FF, FCBG	127	126	120	~124
Total research master's degrees in progress Source: DCSCU	0	0	1	~1
Number of PhD publications (article or review) with WUT affiliation in Web of Science (SCIE, SSCI, AHCI, ESCI) Source: mixed (InCites (Clarivate) input + DCSCU analysis + publications list PhD students CNATCU platform (IOSUD WUT), papers published or accepted for theses publicly defended that year)	missing info	missing info	missing info	-

#### **(Core) measures and instruments to achieve targets / indicators**

- Organize quarterly Info Day events to present active national or international grant competitions.
- Implementation of a research internship program for undergraduate and master students, within the limit of 3-4 annual research fellowships for each STEM field of science, respectively 1-2 annual research fellowships for the other fields of science, as a measure for early retention of human resources with potential and early engagement in research activities before doctoral studies. Particular consideration will be given to students integrated in research teams/research centers.
- Offering international (and Romanian) students a complete package for attracting human resources with research potential, by promoting the (3+5) system that includes master's studies together with doctoral studies, as opposed to the classic (3+2+3) system, especially for the places available in research master's programs. Such a package could include the idea of mentoring and guidance and the choice of a topic of study, under the guidance of a coordinator, from the moment of admission to the research master program.
- Implementation of an 18-24 months integration and professional development program for new WUT employees (teaching and research staff), which will include a mandatory training session in the area of project writing. The participants will receive a scholarship or a grant to cover the training and research hours of the training program.
- Continue the policy of employing fixed-term research assistants, complementary to the policy of employing fixed-term teaching assistants.
- Reforming the methodology for awarding fellowship budget places, based on performance indicators that take into account the scientific targets of the doctoral field (e.g. the type of publications required to complete doctoral studies), of the doctoral supervisors (e.g. through their ability to attract grants containing research assistantships)

or technicians and through the research results obtained from the coordination process) and, last but not least, doctoral students (their willingness to be part of a full-time WUT research team, their willingness to take on publication targets above the minimum standard required - see next point).

- Internal reward of outstanding research results achieved by doctoral students (Web of Science area Q1 or Q2) and contractual financial support for achieving such results.
- Reform of the Master's admission methodology in terms of: (a) prioritizing the allocation of budget-funded and scholarship places for Master's research programmes; (b) revising the minimum number of places required policy by setting lower differentiated thresholds for English-language Master's research programmes, in line with the objective of internationalization and increasing the research potential of the WUT.
- Providing support vouchers to research centers that demonstrate interdisciplinary or transdisciplinary research activities, with a priority route given to collaborations that include a STEM discipline.
- Implement a set of measures to better highlight the WUT's non-discrimination and *gender balance* efforts.

### Objective 3.4. Dissemination and *outreach*

**Background.** The last decade has witnessed major changes in the practice of capitalizing on research results. On the one hand, for the dissemination component of results in academia (through publications, conferences, etc.) there is an increasing emphasis on open science policy. On the other hand, funders frequently request a plan for communicating the results to a wider audience, both to better capitalize on the results obtained and to provide continuing education to the general public, as well as to increase the visibility of research results in society. Although the WUT's presence in the media is consistent, it is often limited to presenting the WUT's position in international hierarchies and promoting cultural and artistic events, with the scientific component not present at all.

#### Targets for 2021-2027

1. WUT is widely implementing the Open Science concept.
2. Increased communication of research results in the media and social media.

#### Performance indicators for O3.4

1. Increase by 2% the share of *gold open access* Web of Science or Scopus publications (*per year, the share is the ratio of gold open access publications to the total number of article or review publications in Wos and Scopus*).
2. 4% increase in the share of publications providing unrestricted access to the database (*yearly, the share is the ratio of publications depositing the database in an open access repository out of the total number of article or review publications in Wos and Scopus*).
3. 2% increase in the share of publications based on pre-registered studies (*annually, the share represents the ratio of publications containing at least one study/experiment pre-registered in an open access repository out of the total number of article or review publications in Wos and Scopus*).
4. Minimum of 20 WUT researchers and teachers trained in open science practices (*annual*)
5. At least one monthly media appearance to communicate research results (*in the form of a communication or article, taking into account the research results obtained under WUT affiliation*).
6. Bi-monthly social media appearances to communicate research results

(free format, taking into account research results obtained under WUT affiliation or announcements of popularization / recruitment of participants for studies conducted by WUT).

### Benchmarks used to compare WUT performance in 2021

	2018	2019	2020	Average
Percentage of gold open access publications (article or review) with WUT affiliation (at least one author) in Web of Science (SCIE, SSCI, AHCI, ESCI) Source: InCites (Clarivate)	107/316 33.86%	141/369 38.21%	148/365 40.55%	132/350 37.71%
Media appearances for the purpose of communicating research results under WUT affiliation Source: InCites (Clarivate)	0	0	0	0

### (Core) measures and instruments to achieve targets / indicators

- Continue to provide full financial support for *gold open access* publications in Web of Science journals in the red zone and, within the available budget, in the yellow zone, both for hybrid and fully *open access journals*.
- Set up an incentive mechanism for other types of open science practice (uploading databases to public repositories, pre-registration of studies, uploading manuscripts to dedicated preprint repositories (following the arXiv model).
- Regular Open Science training sessions.
- Active participation of the WUT in the national RO-NOSCI Open Science Initiative.
- Apply to the WUT for financial support to promote science to the general public by running science popularization events such as Researchers' Night or other popularization events.
- Involving citizens in science projects coordinated by the WUT through *citizen science* or *crowd science* actions.
- Implementation of partnerships with media entities to promote the research results and scientific endeavors of WUT's top researchers, as appropriate, free of charge or in the form of service contracts.
- Stimulating activities to promote WUT scientific results and events in social media (especially Facebook, Twitter and Instagram), with a focus on the information and popularization of science and WUT research results.

Summary table. Link between objectives and proposed measures

Measures / Working tools (labels)	O1.1. Performance boost	O1.2. Infrastructure	O1.3. Networking	O1.4. Human capital	O2.1. EN	O2.2. Environment and energy	O2.3. Health	O2.4. Technology transfer	STEM	Skills Develop.	O3.3. Emerging researchers	O3.4. Outreach
Method. annual evaluation results	X		X									
Method. tiered salaries	X	X	X									X
Method. merit gradations	X											
Method. position/promotion competitions	X			X								
Open access fee subsidies Q1 and Q2	X											
WUT journal grants in WoS/Scopus	X											
Annual progress report science areas	X											
Internal (limited) runner-up grants	X											
Centers of interdisciplinary expertise	X											
ICAM implementation		X										
Feasibility study new investment		X										
Apply to strategic RDI projects		X										
Maintenance/updates equipment/soft		X										
Procedure for equip/soft access		X										
ANELIS Plus Consortia-Like		X										
Extra Access BD competitive areas		X										
Review percentage Indirect / capital		X										
Information and training on grant writing		X						X		X		
Grant writing support (non-scientific)		X										
Project Procurement Administrator		X										
Cluster/consortia spending grants			X									
4-week internship abroad			X									
UNITA, reUNITA, inoUNITA			X		X	X	X	X				
Boosting incoming mobility	X		X									
Establishment of the ICE (Institute for excellence in research)	X			X								
WELCOME experienced researchers	X			X								
PostDoc competitive scholarships	X			X						X		
Integration grants/grants for beginners				X						X		
Research scholarships for master students / students				X							X	
Promoting the Master +PhD + Circle Master Package				X						X	X	
ERA Chair	X			X								
Implement HR Excellence procedures				X								
Equipping 2 IT laboratories / Health		X			X		X	X	X			
Internal grant maturing TRL					X	X	X	X				
Vouchers/subsidies for productive centers								X				
Open-day business environment partners		X	X					X				
TRL training / technology transfer								X		X		
Hiring researchers in priority areas				X	X	X	X		X			
CTT-WUT Authorization / accreditation								X				
Implementation of CTT-WUT procedures								X				
Training CTT-WUT support staff								X				
Innovation support for RDI teams								X				
Innovation entrepreneurship training								X				
Incentives trained participants								X				
Hiring researchers in priority areas				X	X	X	X		X			
Review method. re: intellectual property								X				
Networking of the EIT HEI Initiative								X				



type												
Innovation and Entrepreneurship PLC									X			
Business involvement					X	X	X	X				

**Summary table (continued). Link between objectives and proposed measures**

Measures / Working tools (labels)	O1.1. Performance boost	O1.2. Infrastructure	O1.3. Networking	O1.4. Human capital	O2.1. EN	O2.2. Environment and energy	O2.3. Health	O2.4. Technology transfer	STEM	Skills Develop.	O3.3. Emerging researchers	O3.4. Outreach
InfoDay Grants		X								X		
Internship/fellowships students/masters				X					X	X	X	
Perpetuate policy re: tenure-track beginning				X						X	X	
PhD scholarships policy review												
Policy incentive PhD publications	X										X	
Master's admission review research				X						X	X	
Voucher/collaborative center grants STEM									X			
Fair procedures (e.g. gender balance)				X							X	
OA publication grants in Q1/Q2	X											X
OA (Open Access) training										X		X
Participation RO-NOSCI OA / similar												X
Researchers' Night events												X
Citizen science actions												X
Promoting WUT science in the media				X								X
Promoting WUT science in social media				X								X

**Summary table. Linking the objectives in the research strategy with the vice-rector responsible for meeting the objectives**

Measures / Tools (labels)	O1.1. stimulation performance	O1.2. Infrastructure	O1.3. Networking	O1.4. Capital human	O2.1. EN	O2.2. Environment and Energy	O2.3. Health	O2.4. Transfer technological	STEM	O3.2. Skills Develop.	O3.3. Researchers emerging	O3.4. Outreach
Research strategy	X	X	X	X	X	X	X	X	X	X	X	X
Academic strategy	X			X						X	X	
Financial strategy	X	X	X	X	X	X	X	X	X	X	X	X
Internationalization strategy	X		X	X				X				
Institutional partnerships			X		X	X	X	X				X
Heritage		X										
IOSUD	X			X						X	X	
DGA	X	X			X	X	X	X				