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Comprehensive study of Technology Transfer Ecosystem

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1 Content

1 Introduction

According to the 2024 report of the European Commission's Joint Research Centre entitled "Strategic evaluation of the technology transfer and IPR protection systems of Bulgaria, Croatia and Romania and recommendations for their enhancement", Bulgaria is making tangible efforts towards building an effective technology transfer (TT) system[i].

This started with the creation of Centres of Competence (CoCs) and Centres of Excellence (CoEs) in an attempt to consolidate national research and innovation (R&I) resources. It is more recently evidenced by the introduction of targeted reforms under the Recovery and Resilience Plan (RRP) combined with the largest funding to date for TT activities and capabilities (both grants and equity) under the current Programming Period (Programme "Research, Innovation and Digitalisation for Smart Transformation" 2021-2027).

At the regional level, several pockets/hubs have been identified with potential for TT: the capital, Sofia, and the cities of Plovdiv, Varna and Gabrovo with their Technical and Medical Universities/Faculties. These have largely resulted from the creation of the CoCs and CoEs and now demonstrate potential to become drivers for regional innovation and high value-adding jobs.

1.1 Work methodology

The study has been carried out on the basis of a desk research of different sources, available on the Internet. The first step was to identify previous research which had been conducted on the topic and to consult the relevant materials produced, such as reports, papers, studies, etc. Other sources of information used in the study include websites of different organisations and stakeholders involved in the field of technology transfer. The sources and literature consulted throughout the study can be found in section 11 "Bibliographic references".

2 Background/Environment

The Bulgarian Research and Innovation (R&I) ecosystem is governed by the Ministry of Education and Science; Ministry of Innovation and Growth; Ministry of Economy and Industry; and Ministry of Finance. It comprises 52 universities; 42 research units (institutes) of the Bulgarian Academy of Sciences (BAS), which are developing four Centres of Excellence (CoE), ten Centres of Competence (CoC), and two Horizon-funded Centres. In some cases, other Ministries are responsible for parts of the R&I ecosystem such as the Ministry of Health for the National Centre for Infectious and Parasitic Diseases.

At present, the investment/expenditure on R&D is significantly higher in the private sector (approx. 0.7 % compared to the government budget allocations amounting to 0.25 % of the GDP). The latest European Innovation Scoreboard of 2024[ii] indicates that innovation performance is increasing at a rate lower than that of the EU, being below the average of the emerging innovators, with the research and development (R&D) expenditure in the business sector marking a slight increase in the last year.

At present, TTOs in Bulgaria are established in the following ways:

- institutional and without separate legal personality, in some cases part of larger institutional R&D sectors with their own budgets and a degree of organisational independence - such as Technical University-Sofia and Sofia University. These TTOs are

based in and forming an integral part of the structure of a university or a public research institute;
- in several cases TTOs are independent or semi-independent entities organised as nongovernment/not-for-profit associations serving a particular research organisation (e.g. Quasar TTO serving the Centre of Competence);
- a dedicated company, 100 % owned by the university (Plovdiv University Centre for Technologies, established in 2022);
- a few private consultancies offering TT services. These are often engaged more broadly in EU project management and advisory services. In some cases, they take part in non-profit associations mentioned above.

Within the bodies implementing Technological Innovation there are also the National Patent Office; Sofia Tech Park; Bulgarian Small and Medium Enterprises Promotion Agency (BSMEPA); National Science Fund; National Innovation Fund; Fund of Funds; VC Funds and Business Angels; a number of Clusters and Industry Associations; Several Start-up Accelerators and Incubators; a number of Innovation and Technology Transfer oriented NGOs.

Out of the 52 universities, and with Decision No 539 of 22nd July 2021 the Council of Ministers, following a set of specified research performance and outcome merit-based criteria, has selected the following universities as "research based": Sofia University, Medical University – Sofia, Medical University – Varna, Medical University – Plovdiv, Technical University of Sofia, University of Chemical Technology and Metallurgy, Plovdiv University. At a later stage, 3 more universities were added to the list - Medical University of Pleven, Trakia University and Ruse University.

In accordance with the requirements for funding under the Recovery and Resilience Plan, which is the main source of funding for the research activities, up to 10 % of this funding should be spent on Intellectual Property (IP) protection and TT. Main activities to be funded include capacity building and personnel; training of the personnel, researchers and students; transfer of knowledge; patent application and IP protection.

The universities' research activity is regulated by several key normative documents: 1) Law of Higher Education; 2) Regulation on the conditions and procedure for evaluation, planning, allocation and spending of funds by the State budget to finance the intrinsic research and creative activities in higher education institutions, Council of Ministers Decree No 233 of 10.09.2016 (effective since 2017); 3) Statute for Monitoring and Evaluation of the Scientific and Research Activity done by Higher Education Institutions and Research Organisations, as well as National Science Fund Activity, of 2018; and 4) Decree No 61 of the Council of Ministers of 02.04.2020 laying down the procedure for establishment of commercial companies by state-owned higher education institutions for objectives for the commercialisation of scientific results research and intellectual property objects.

The R&D sector's activity is funded by the state budget, national and international programmes (subject to successful projects applications), and contractual research with industry. Almost all universities have IP Policies and IP protection Statutes in place (in 2015, this has been required formally by the Ministry of Education and Science). Institutional policies/rules often provide for a percentage of the proceeds/revenues from commercialisation to be awarded to the authors and a percentage to remain at the University. The university rules of the various institutions appear to have similar content albeit with some differences and, in some cases, stipulate part of the revenue to remain at the level of the R&D Sector and another part at the level of the unit contributing most to the achievement

The IP protection and commercialisation processes at the Bulgarian Academy of Sciences (BAS) seem to be more developed than in the university system. However, the main obstacles which have been inhibiting these processes are the lack of dedicated resources (including human);

somewhat unclear and not well-tested IP commercialisation procedures; lack of dedicated funding to support preliminary actions as well as the involvement of research staff. The resources needed for IP protection and maintenance often are provided through various projects as the only sources of funding and this does not allow sufficient continuity. There has not been funding for the preliminary study and valorisation process. Often and due to lack of real knowledge and trust in the formal procedures, industrial companies contact researchers directly and the commercialisation occurs as a result of ad hoc personal relations. Though there is a formally established Joint Innovation Centre (JIC) which is aimed to provide BAS' institutes with innovation management support, IP protection support and IP management, researchers and research institutes seldom request support in practice. Instead, they prefer to manage IP themselves or seek consultancy and support from the GIS-Transfer Centre although the formal central TT structure of BAS is the JIC.

Over the last 20 years, a number of TTOs have been established within the frame of R&D Sectors, in universities as well as in the Bulgarian Academy of Sciences, and some private NGOs. They were funded and created within projects funded under various national programmes, such as BG 2005/ESC/G/TTO Establishment of Technology Transfer Centres in Bulgarian Higher Education Schools and in Public Research organisations and Operational Programme "Development of the Competitiveness of the Bulgarian Economy" for BG161PO003-1.2.02 "Establishing new and strengthen existing offices for technology transfer". However, since they were created as part and deliverable of projects, many of them remain as "artificial" structures with decreasing TT functions and limited impact and recognition among academics and researchers. Typically, there are only one or two persons permanently employed in most of the TTOs. In many cases they have legal background and are able to provide mostly administrative support, consultancy and training. The TTOs' competencies and capacity in IP commercialisation and marketing, with a few exceptions, are rather limited. Overall, the activity in most TTOs is focused mainly on training, project applications, and management, they are rarely engaged in real IP protection and very seldom in IP commercialisation. The cases of successful technology transfer are limited, though there are several good practices of licensing, effective collaboration, and contractual research. BAS managed to establish seven spin-offs, but eventually most of the institutes involved in their establishment sold their shares.

The adoption of the relatively new Decree No 61 of the Council of Ministers of 02.04.2020, was supposed to facilitate the spin-off creation from universities. However, Decree No. 61 is not completely accepted by the academic community at universities and its adoption has not been effectively used in practice. To some extent this is due to their hierarchical centralised management structures and historically established organizational culture. In addition, there are limiting aspects of the regulation related to the creation of spin-offs. Each university is allowed to invest only up to BGN 10,000 BGN (about EUR 5,000) into a spin-off project, which in many cases is very restrictive and is often seen as inhibiting the TT process. Further, many of them express concerns regarding potential conflicts and contradictions with other legal documents, such as Public Funding Law; Public Procurement Law; Public Enterprises Law and fear probable objections by Court of Auditors and other monitoring authorities.

The decision-making bodies of the Bulgarian Universities in most cases are the Academic Councils, consisting of approximately 20 to 30 people with varying views and interests. Bearing in mind the hierarchical and often very centralised governance structures, the IP commercialisation process becomes even harder. The Procurement and Public Funding legislation also limits to a certain extent the flexibility of universities in terms of commercialisation of the research results. All these issues demotivate and eventually kill any desire for commercial activity or spin-off creation among researchers.

2.1 EIS in Bulgaria

In its "European Innovation Scoreboard 2024 – Country profile Bulgaria", the European Commission rates Bulgaria as an **Emerging Innovator** with performance at 46 % of the EU average. Performance is below the average of the Emerging Innovators and is increasing at a rate lower than that of the EU (+10%).

In 2024, **PhD graduates** in Bulgaria amounted to 47.6 % relative to the EU, marking a decrease of 11.6 % in comparison to the EU's average for the period 2017-2023, but an increase of 11.6 % compared to the period 2023-2024.

In 2024, **attractive research systems** amounted to 30.4 % of the EU's average, recording an increase of 14.3 % in comparison to the EU's score for the period 2017-2024 and a growth of 7.5 % compared to the period 2023-2024.

In 2024, **finance and support** amounted to 26.9 % relative to the EU, marking a slight increase of 0.9 % in comparison to the EU's average for the 2017-2024 period and a growth of 2.1 % compared to the 2023-2024 period.

Last year, **firm investments** amounted to 36.7 % of the EU's average, recording a decrease of 10.3 % compared to the EU's score for the period 2017-2024, but a minor increase of 1.5 % in comparison to the 2023-2024 period.

In 2023, **innovators** amounted to 29.4 % relative to the EU, marking an increase of 4 % compared to the EU's average for the period 2017-2024, but a decline of 37.9 % in comparison to the 2023-2024 period.

Last year, **intellectual assets** amounted to 91.9 % of the EU's average, recording a decrease of 15.8 % compared to the EU's score for the 2017-2024 period, but an increase of 14 % in comparison to the 2023-2024 period.

The following indicators have been identified as **relative strengths** of the country: Design applications; Trademark applications; Environment-related technologies.

The indicators identified as **relative weaknesses** include: Direct and indirect government support of business R&D; Population involved in lifelong learning; Resource productivity.

Bulgaria has been making efforts to strengthen its research system since 2017, resulting in steady improvements in the quality of scientific publications due to alignment with EU standards. However, Bulgaria's performance in framework conditions remains below the EU average for all dimensions. The main weakness is the population involved in lifelong learning, well below the EU average and ranking last among EU Member States.

Bulgaria's research system maintains a positive trend in attractiveness, with an increase in scientific publications among the top 10% most cited and a significant increase in foreign doctorate students since 2017. On the other hand, international scientific co-publications between 2023 and 2024 basically plateaued, possibly due to limited funding and insufficient collaboration incentives.

Bulgaria's digitalisation level is low, with a significant weakness in individuals with above-basic overall digital skills, potentially due to gaps in digital education and a lack of access to advanced technology trainings.

R&D financing by Bulgaria's private sector exceeds that of the public sector, mainly due to venture capital expenditures, which significantly grew in the last year. Venture capital expenditures is one

of Bulgaria's strengths, ranking second among Emerging Innovators and above several Moderate Innovators.

On the other hand, direct and indirect government support for business R&D has experienced a negative trend, declining over the past two years and since 2017. Meanwhile, both R&D and non-R&D expenditures have decreased for all three firm investment indicators since 2017.

Bulgaria's performance in innovation activities has fluctuated over time. While there has been a decline in the number of SMEs introducing business process innovations, the number of SMEs introducing product innovations increased since 2017.

In terms of linkages, the country has experienced an increase in relation to 2017 – due to the growth of innovative SMEs collaborating with others and public-private co-publications.

Bulgaria's performance in terms of intellectual assets is marked by a sharp decline in design applications and an almost negligible decline in PCT patent application, while trademark applications – in countertendency with the overall trend for the indicator – grew.

The trends for the impact of innovation activities in Bulgaria are mostly positive, showing significant progress in several areas. All employment impacts and sales impacts have a positive trend since 2017 – with a notable increase in employment in innovative enterprises and sales of new to market and new to firm innovations.

2.2 Legislative Frameworks

Law on Promotion of Research and Innovation (adopted in April 2024) - it advances sustainable planning of national instruments and measures to support excellence in science and applied research for the benefits of the economy and for building up the European research area. The main goal of the Law is to regulate the principles, mechanisms and instruments for developing and implementing the state policy to promote research and innovation in the country. The Law favors enhanced coordination between sectoral policies and policy instruments based on regulated functional relationships between all actors in the national research and innovation ecosystem.

It introduces a legal framework for innovation policy and for technology transfer including intellectual property rights. By means of the new Law, funding for R&I will be distributed in a more effective and sustainable way, which will increase the national scientific capacity and boost research outputs. The Law will secure the coherence and synergy of strategic and operational documents, such as the National strategy for research development, The National Innovative strategy for smart specialization, the National framework program for R&I, the National roadmap for research infrastructures, mission driven programs for research and for innovation.

Patents and Utility Models Registration Act sets out the provisions related to inventors, researchers, and partnerships registering Patents and Utility models. The Industrial Design Act, the Trademarks and Geographical Indication Act, the Integrated Circuit Topology Act, and the Copyright and Related Rights Act provide protection for inventions, trademarks, and industrial designs.

Decree No 61 of the Council of Ministers of 02.04.2020 laying down the procedure for the establishment of commercial companies by state-owned higher education institutions for the commercialisation of scientific results research and IP objects. It provides a framework for the transfer of technology from research institutions to the commercial sector, in particular through the creation of and participation in spin-off companies. It gives several entrepreneurial decisions

and responsibilities to the Academic Councils and no provisions for the inventors/researchers to receive/hold equity (which hinder the development of spin offs by universities).

The **Bulgarian Academy of Sciences** has its own law (last amended in 2018) for governing its activities and consequently the IPR development and commercialisation of research results. The law provides that the Academy can conduct commercial activity connected to its research and the application of its research results. Moreover, the law provides that the independent Institutes conduct fundamental research, preparation of PhDs, applied and technological activity. The Academy and its independent Institutes can hold ownership rights in properties, patents and equity participation in commercial companies or associations.

Law on Higher Education - governs the University activities framework, entrusting to University Councils several initiatives. The Law on the Development of Academic Staff Article 2b. (in force as of May 2018) provides for the recognition of academic staff efforts in patenting whilst they are evaluated for career advancement, in par with other scientific indicators, but do not actually evaluate whether these patents were commercialised or whether researchers contributed to the gain of economic benefits to the University through IP commercialisation, TT, and business R&D cooperation.

3 Strategy for TT

National Strategy for the Development of Scientific Research 2017-2030

The strategic document defines the state's objectives and the respective measures for the development of scientific research in the period 2017-2030. The strategy begins with an analysis of the state of scientific research in Bulgaria and continues with setting out the visions, objectives, policies, actions and measures related to the development of scientific research as well as organisations responsible for control of the strategy's implementation.

Innovation Strategy for Smart Specialisation 2021-2027

The strategy represents a political concept for support of regional prioritasation in innovative sectors, fields or technologies through the entrepreneurial discovery process. It recognizes importance of the ICT sector and its big discrepancy in international performance and impact to GDP in relation to other technological sectors. Thus for upgrading other sectors the strategy proposes to give emphasis to technology uptake by businesses in environmental and green technologies, in circular economy and space sector, while giving emphasis in technology transfer activities in these sectors where the R&D system has significant competences.

3.1 Global strategy of HEIs in TT

Technical universities and universities doing fundamental research in core disciplines such as physics, chemistry, biology, medicine, etc. are more actively involved in IP/TT activtiies. The research taking place at technical universities is mostly applied - practically oriented, which explains their good traditions and more active collaboration with industry.

Some examples of strategies related to TT developed by Bulgarian HEIs can be found below:

- Strategy for Commercialisation of Scientific Research of Sofia University - link
- Policy on Exploitation and Commercialisation of Scientific Research Results of the Academy of Economics, Svishtov - link
- Strategy for Development of Scientific Research 2021-2025 of Varna University of Management - link

3.2 Map of Stakeholders

University TTOs

Technology Transfer Office of Sofia University - http://tto.bg

The mission of the Technology Transfer Office at Sofia University "St. Kliment Ohridski" is to act as a mediator between the university research departments and industrial enterprises thus supporting the transfer of scientific knowledge and technology, and to encourage the innovation and entrepreneurial spirit of scientists and researchers establishing a proper business climate in the university environment.

Big Data for Smart Society (GATE) Institute, Sofia University - https://gate-ai.eu/

The Big Data for Smart Society Institute (GATE) is the first Centre of Excellence in Bulgaria to work on integrating and extending scientific excellence and innovation in priority areas such as Big Data and Artificial Intelligence at regional and European level. GATE is an investment in people. The Institute aims to attract, inspire and cultivate the next generation Early-Stage Researchers who, under the guidance of leading scientists, will work with enthusiasm and curiosity in the field of Big Data and Artificial Intelligence.

Institute for Computer Science, Artificial Intelligence and Technology (INSAIT), Sofia University - https://insait.ai/

INSAIT is the first of its kind in Eastern Europe to offer world-class research facilities and conditions. Founded in April 2022, in partnership with Switzerland's ETH Zurich and EPFL, two of the world's best technical universities, and is closely advised and supervised by top academics from some of the most elite US, European, and Israeli universities and research labs. INSAIT is also generously supported by donations from Google, Amazon Web Services, DeepMind, SiteGround, VMware as well as many tech entrepreneurs. INSAIT's sole focus is on scientific excellence: conducting world-class research, attracting outstanding international scientists, and training the next-generation of graduate students and technology leaders.

The Institute offers a"Startup Researcher Programme", which formalizes and systematizes the process of creating deep-tech startups (which takes place in world-class universities) and serves as a feeder to seed-stage funding VCs. The program helps researchers immerse themselves into the deep science underlying and necessary for creating deep-tech startups, all with the support of world-class researchers who are also entrepreneurs and have created such startups before. The project targets innovations spanning all research areas of artificial intelligence and computer science. The researcher can be a graduating B.Sc. student, a graduating M.Sc. student, or a graduating Ph.D. student. The benefits provided to the the start-up researchers include:

- €200,000 to work on up to two years of research that can lead to deep-tech startups, with the option to bring up to two team members who also immerse themselves in this environment. The €200,000 covers the salary for the team as well as part of the computing power;
- Access to world-class scientific advisors and mentors: top professors and mentors at ETH Zurich, EPFL, MIT, Stanford, and the Technion who have gone through the entire process successfully many times;

- Access to Talent: other researchers whom you could discuss with to join your project idea as co-founders or core team members;
- Access to top-tier US and European and local investors which INSAIT mentors and faculty have direct access to.

Research and Development Sector of the Technical University of Sofia - https://www.tu-sofia.bg/university/read/1

The sector is an independent unit responsible for organising, coordinating, and servicing the research, development, and applied activities at TU Sofia, operating since 1963. Over the years, this unit has established itself as the main unit facilitating the collaboration between researchers and research teams of the university and industry. In practice, over the last 15 years the R&D Sector/Centre of TU Sofia plays also the role of university TTO. Its activities are funded by state budget, national and international research programmes, and contractual research, the latter accounting for about 30 to 40 % of the total income. Since 2015, with the introduction of the new IP Policy and Statute, a Committee on Intellectual Property has been formed with an Ordinance of the Rector. The Committee consists of five members with engineering background and two members with expertise in IP legislation. Since the establishment of this Committee, the Technical University of Sofia has revived its IP portfolio and at present is owner of 20 national patents and 15 utility models. At the end of 2022 there were five new patent applications and one application for utility model. There are also many patents and utility models authored by researchers of the TU Sofia, but owned by the private companies, who have provided the R&D funding. Despite the fact this is far from the times (before the transition of 1990) when TU Sofia was owner of over 400 patents and utility models (which, however, were not in the open market) this activity appears to be evolving in the right direction.

Institute of Intellectual Property and Technology Transfer of the University of National and World Economy - https://iiptt.unwe.bg/

This is a unit for research in the field of intellectual property, which is well-known on the national and international level. It organizes and conducts research in the field of intellectual property, innovation industries, cultural industries, digitalization and cultural heritage. In partnership with government institutions, it participates in the development of national legislation and strategic documents regarding intellectual property. The institute works in close cooperation with the World Intellectual Property Organization, the European Patent Office, the Regional centre for safeguarding of intangible cultural heritage in south-eastern Europe under the auspices of UNESCO and other organizations. It provides expert knowledge and services to small and medium-sized enterprises related to the protection, use and management of their intellectual property.

Technology Transfer Office and Start-up Academy of Plovdiv University - https://tto.uni-plovdiv.bg/

The Technology Transfer Office of Plovdiv University supports the industrial implementation of innovative scientific research in Bulgarian and foreign companies. The Start-up Academy managed by the TTO aims to support entrepreneurs in starting their business project. Young entrepreneurs have the opportunity to acquire new skills and enhance their competencies by

attending specialised courses, participating in different events and meeting with experts and successful entrepreneurs.

Centre of Technologies of Plovdiv University - https://pu-technocentre.eu/

The Centre of Technologies is the Flagship R&D structure of the University of Plovdiv, committed to introducing and excelling Bioeconomy & Biotechnologies. The Mission of the Centre is to set new dimensions of thinking about Bioeconomy & Biotechnologies through introducing Business-to-Business (B2) partnership forms and real market applications of innovative high added value solutions, based on the capitals of the Nature.

University Centre for Scientific Research and Technologies at Technical University of Gabrovo - https://www.tugab.bg/nauchna-deinost/utznit

This is the unit responsible for registration, protection, and utilisation of the IP in the TU Gabrovo. Since 2015, the University has accepted a Statute for IP management aimed at protecting the ownership of various kinds of IP created by academic staff, PhD and other students. The university has its own Register of IP. The IP protection process is responsibility of the centre with the aid of an Information Consultancy Centre, called “IP Point” at the University Library. There is no permanently employed personnel working on IP protection. According to the Statute, whenever there is an application for protection of IP submitted, the Rector assigns a committee to evaluate its potential and to file the formal application on behalf of the University at the Patent Office.

In general, Technical University - Gabrovo has good relationships and collaboration with industry. Six of its laboratories have 13 research contracts with various companies in the fields of Metal testing, Textile, Internet of Things, Environmental protection.

TU Gabrovo is one of the members of the recently established Gabrovo Tech Park. At present there are 18 laboratories within the framework of Gabrovo Tech Park. Driven by the desire to further develop the local ecosystem they collaborate tightly with Sofia Tech Park and are showing a proactive attitude towards the transfer of knowledge and good practices. The first results of this developing ecosystem are 17 contracts with six local companies and one contract with a company from abroad.

Centre for Intellectual Property Management and High Technology Park at Technical University of Varna - https://vtp-tuv.com/index.html

Established in 2019, the centre is the only one of its kind in Eastern Bulgaria. It operates in several directions such as: providing consultancy, legal, and administrative support to academics and to business representatives with patents and developing utility models application documents; mediation in case of legal disputes; establishing partnerships between university and business; commercialisation and capitalisation of research results; and facilitating the IP valorisation protecting the interests both of university and researchers. The centre has signed a Memorandum for Cooperation with the Bulgarian Patent Office and works extensively towards raising awareness about the role of university intellectual property and its importance and value among students, PhD students, researchers and academics, as well as all employees of TU Varna. The Centre employs one full time employee with legal and engineering background.

High Technology Park – Technical University of Varna is a research organization with activities in science research, design and introduction of new technologies, consulting, controlling and

certifying of materials, equipment and products at all stages of projecting, production and exploitation.

Centre for Technology Transfer of University of Forestry - https://ltu.bg/en/science/transfer-of-technology/center-for-technology-transfer

The mission of the Center for Technology Transfer (TTC) of the University of Forestry (UF) is building a bridge between science, bio-industry and structures dealing with management and sustainable use of biological resources in Bulgaria. Its specific tasks are:

- Ensuring transparency on innovative products and research results of the UF and the existing needs of Bulgarian enterprises and provide two-way exchange of information;
- Support for the commercialization of research results and innovative products of the UF;
- Support for the protection of industrial and intellectual property of the UF, technical maintenance and negotiation of this protection in coordination with researchers and administrative services of the business;
- Search for markets in applied science products of the UF at national and international level;
- Provide funding for applications developed from various national and foreign resources from the public and private sectors.

Centre for Technology Transfer at the University of Chemical Technology and Metallurgy - https://ctt.uctm.edu/

The centre's mission is to protect the intellectual property of the University of Chemical Technology and Metallurgy (UCTM) and to seek the best possible market realization of the products and technologies created as a result of UCTM research activities.

Technology Transfer Centre at University of Ruse - https://www.uni-ruse.bg/centers/TSTT

The centre has been established in 2008 and acts as intermediary between the technology developers from Ruse University and industry. One of its main aims is to satisfy the needs of industry with technologically viable solutions. The TT Centre works in tight collaboration with the Intellectual Property Centre and the Entrepreneurship Fostering Centre. Since 2020, the IP Centre and the TT Centre have been united in the present Centre for Technology Transfer and Intellectual Property.

The University has IP Policy and Statute and owns two active patents and three active utility models. There are two patent applications. However, a number of patents authored by University researchers are privately owned. The Research and Development sector of Ruse University is involved in several collaborative research projects with industry. At present there is a substantial part of research funded by industrial companies. The centre is trying to strengthen its role in the matchmaking between researchers and industry and make these processes more systematic, whilst still some of the IP has not been formalised in the public domain or may have been registered as private property.

Together with the local Municipality and business, the centre works towards creating a local ecosystem facilitating the technology transfer. Substantial part of these activities are regular trainings, workshops, video series with internationally recognised associations, such as WIPO.

Centre of Applied Research and Technology Transfer of Shumen University - https://www.shu.bg/centers/ctt/

The main objective of the centre is to carry out marketing and advertising activities to promote the capacity of the academic community of Shumen University by ensuring the process of technology transfer between the demand from the business side and the supply from the university side of innovative products and technologies.

Bulgarian Academy of Sciences' TTOs

Joint Innovation Centre of the Bulgarian Academy of Sciences - www.jic-bas.eu

The Joint Innovation Centre is a coordination unit for implementing the policy of BAS – in the fields of innovation and patent activities, and project competence. The Centre provides information for applying to calls under EU Structural Funds and "Horizon Europe"; supports the preparation and implementation of project proposals. The Centre maintains business contacts in the country and abroad concerning innovations and applied research transfer, and supports the establishment of contacts "science – business" and "science – science".

Technology Transfer Office of Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences - https://ott-iict.bas.bg/

The main goal of the TTO is to support the establishment of a national pro-innovation infrastructure in the sectors of Energy Efficiency and Information and Communication Technologies, as a key factor for the development and enhancement of the 'science to business' relation, promotion of new knowledge and technologies transfer towards Bulgarian enterprises in support of their competitiveness and sustainable development.

RISK–SPACE-TRANSFER Technology Transfer Office, Bulgarian Academy of Sciences - https://rst-tto.com/

The main purpose of the office is strengthening the connection between science and business and institutions, to be a link between innovative technologies and the end-users. Its aim is to help the whole process of creating a technology product to its implementation and realization in the economic and social life for increasing the competitiveness of the economy, organizations and society. The main role of the TTO is to encourage the creation of innovations through improving the innovation structure and know-how.

Public body

Patent Office - https://www.bpo.bg/en/home

The Patent Office of the Republic of Bulgaria is a national state body for legal protection of industrial property, second level spending unit at the Ministry of Economy and Industry.

This is a modern state institution whose vocation is to work for the implementation of the modern system for protection of industrial property.

Its mission is to pursue an independent state policy for legal protection of industrial property, to promote innovation, competitiveness, entrepreneurship and economic growth for the benefit of society as a whole, to turn its customers into its partners by providing them professionally and correct service and high quality products that permanently meet their requirements and needs, to be an active partner of companies, entrepreneurs, universities, research institutes and others, to maintain and increase the innovation potential and achieve social, cultural, technological and economic prosperity of the country.

Other TTOs

Sofia Tech Park – https://sofiatech.bg/

Sofia Tech Park is Bulgaria's first science and technology park focusing on information technology, life sciences and green energy. It offers services to support start-ups, small and medium-sized enterprises, science, education, innovation and technology. As regards TT, it covers the very early-stage technology start-ups and ambitiously indicate that they can proactively provide the expertise needed to support research organisations in the TT process and TT services in general. Some universities and institutes of BAS have throughout the years developed good collaborations with Sofia Tech Park.

GIS – Transfer Centre Foundation - https://www.gis-tc.org/

GIS-Transfer Center is the first and only one in Bulgaria organisation structured as a national network of 31 centers which cover the main sectors of economy and science and supports the process of technology transfer of research competitive products, know-how, advice and expertise with an emphasis on SMEs and vice versa.

National Technology Transfer Office in ICT of the Bulgarian Association of Information Technologies - http://www.tto-bait.bg/

The National Technology Transfer Office (TTO-ICT) is established to facilitate the process of technology transfer between innovators, researchers and users of innovations in practice. TTO-ICT is fostering communication between entrepreneurs, companies in the ICT sector, business organizations and universities in Bulgaria and all over the world.

The activity of the office is focused on the performance of technology transfer between the innovator and the developer of scientific and technological product and ideas and the recipient (mainly SMEs who need both the introduction of new competitive products and to address the specific problems encountered in the process of their production activity).

Center for Innovation and Technology Transfer – Global - www.citt-global.net

Center for Innovation and Technology Transfer – Global is a Bulgarian company set up with the aim of facilitating transfer of innovative knowledge and technologies on international level. CITT - Global's major objective is to contribute to the use of innovations on a global scale, as well as, to popularize best practices. The company specializes in education, consultation, management and implementation of innovative projects associated with the transfer of know-how and technologies

from academic institutions and scientific-research centers to small and medium enterprises and state administration in the field of information technologies.

Institute for Technology Transfer and Innovations - https://ittibg.org/

The Institute for Technology Transfer and Innovations (ITTI) is a HUB working towards the creation and the development of a national innovation infrastructure, the spreading of new knowledge, the stimulation of technological entrepreneurship, the transfer of knowledge and technologies and the market application of innovative products. The activities of the Institute serve as a mechanism for the development and financing of research, development and application of innovations.

Venrize - https://venrize.com/

Venrize is an innovative company witch provides support and services for universities, scientists, existing spinoffs as well as investors and corporations. They manage and coordinate a broad network of stakeholders connected to technology transfer, science-based innovation and academia spinoffs. The company is one of the founders of Spinoff Bulgaria (https://spinoff.bg/) - the largest initiative dedicated to technology transfer, science-based innovation and spinoff investments in Bulgaria and the region.

Technology Transfer Office PROINNO - https://www.proinno-bg.eu/en-home/

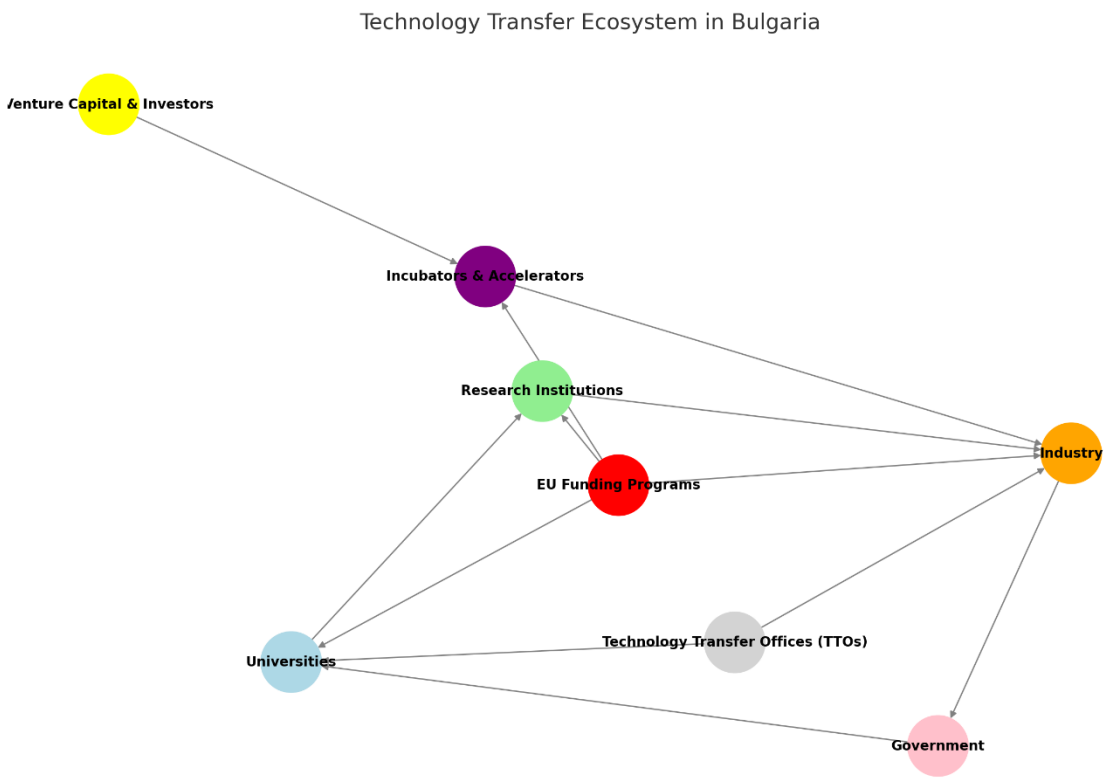
TTO PROINNO is a joint structure initiated by the Joint Innovation Centre of BAS and Foundation GIS-Transfer Centre. The main objective of the TTO PROINNO is to enhance the interaction and to build an effective link: "science – business – market" by providing systematic consulting services, supporting the transfer of ecological solutions and technologies, environment friendly and energy-saving technologies, technologies related to health and quality of life, green and sustainable building, improving the quality of the urban area environment, intelligent systems for sustainable development, etc.

4 TT Structures

Most TTOs in Bulgaria remain as "artificial" structures with decreasing TT functions and limited impact and recognition among academics and researchers. The TTOs provide mostly administrative support, consultancy and training services. The TTO's competencies and capacity in IP commercialisation and marketing, with a few exceptions, are rather limited. The activity in most TTOs is focused mainly on training, project applications, and management, they are rarely engaged in real IP protection and very seldom in IP commercialisation. The cases of successful technology transfer are limited, though there are several good practices of licensing, effective collaboration, and contractual research.

Most TTOs focus on all types of capacity building and TT supporting activities, e.g. building relationships with business. Whilst these are also needed, TTOs somehow miss their most important task: to evaluate which research findings are patentable and to develop the commercialisation of IP.

4.1 TT System Scheme



This scheme highlights the key stakeholders and their relationships:

- Universities: Engage in research and provide a knowledge base.
- Research Institutions: Conduct specialized research, often collaborating with universities and industry.
- Industry: Utilizes research outputs to develop products and innovations.
- Government: Provides policy support, funding, and regulation.
- Incubators & Accelerators: Support start-ups with resources and mentorship.
- Venture Capital & Investors: Provide funding for innovative projects and start-ups.
- Technology Transfer Offices (TTOs): Facilitate the commercialization of research from universities and research institutions.
- EU Funding Programs: Offer financial support for various stages of technology transfer and innovation.

This interconnected network fosters collaboration, funding, and the commercialization of research and innovation.

4.2 TT Procedures

Out of the 52 Bulgarian universities only 10 have any patent activity, and the most active are: Technical University of Sofia; Ruse University, Varna Technical University; Sofia University; University of Plovdiv; and University for National and World Economy. For the Academy of Sciences, 19 Institutes have IP protection activity and the most active are: Institute of Robotics; Institute of Space Research and Technology; Institute of Informatics and Communication

Technology; Institute of Solid-State Physics, and Institute of Polymers. At present, there are no official statistics about the commercialisation of the IP (besides the information collected where GIS-Transfer Centre reported they have participated in seven spin-offs over the last couple of years). No university spin-off has been created since the establishment of the relevant law in 2016 nor following the implementing rules.

4.3 Strengths and Weaknesses of TT Units/Offices

Strengths	Weaknesses
Abundance of accelerators, Business Angels, VCs, funding programmes for start-ups, regional Cooperation with other Innovation ecosystems such as those of Turkiey and Greece	Most TTOs are project-based, lacking sustainability and long-term vision
Adoption of new Law for Promotion of Research and Innovation	Over reliance on EU-funded programmes and national budget-based programmes
ICT and digital start-up sector is developing very well	Lack of capacity and expertise to evaluate research findings with the potential to become patentable and develop commercialisation of IP
Potential for development of R&I ecosystem, attract leading scientists and conduct world class research	Legal and regulatory framework governing public research does not provide adequate incentives to public institutions' researchers to cooperate with industry
	Limited and inefficient cooperation between TT stakeholders

4.4 TT Structure Best Practiques

Sofia Tech Park - https://sofiatech.bg/

Sofia Tech Park is the first science and technology park in Bulgaria, acting as a hub for global, regional, and national researchers and innovative companies, focusing on information technology, life sciences and green energy. Its main priorities are to enhance the competitiveness of science and entrepreneurship by improving knowledge exchange between academic circles and the business community, supporting startup companies and innovative ideas, and catalyzing the commercialization process of scientific research. More details about this best practice can be found in A5 "Research on Best Practices in Technology Transfer".

5 TT Instruments

Licences and patents

Ten Bulgarian universities have any patent activity, with the most active being: Technical University of Sofia; Ruse University, Varna Technical University; Sofia University; University of Plovdiv; and University for National and World Economy. Below is provided data on the activities of some of the abovementioned universities in relation to licences and patents.

As of late 2022, Sofia University has ownership of two active patents and has submitted ten new patent applications. However, so far there are no cases of patent licensing or trading.

Recently, the Technical University of Sofia has revived its IP portfolio and at present is owner of 20 national patents and 15 utility models. At the end of 2022, there were five new patent applications and one application for utility model. There are also many patents and utility models authored by researchers of the TU Sofia, but owned by the private companies, who have provided the R&D funding. TU-Sofia has also submitted patent applications internationally.

Plovdiv University is owner of six patents, but only one of them is recently granted and still active. The other five are registered, but the protection rights were lost over the years. The University also has three active utility models and is co-owner with other academic institutions and inventors of another five utility models. At present, the University also has three new patent applications.

Ruse University owns two active patents and three active utility models. There are two patent applications. However, a number of patents authored by University researchers are privately owned.

At present, Technical University – Gabrovo has two patents and one utility model.

Research contracts

Six of the laboratories of the Technical University of Gabrovo have 13 research contracts with various companies in the fields of Metal testing, Textile, Internet of Things, Environmental protection.

Spin-offs

Since the establishment of the relevant law in 2016, no university has managed to create a spin-off. The Bulgarian Academy of Science managed to establish seven spin-offs, but eventually most of the Institutes of BAS involved in their establishment sold their shares.

5.1 Exchange of Research Staff with Companies

University-business mobility is one of the most interesting mechanisms to promote knowledge transfer. *List and describe what are the main mechanisms to promote this mobility? (for example, University-specific programmes, contracts, Business Chairs, calls for research stays ..).* *Which are the legal procedures for the exchange of personnel between companies and public center?* *How is the workflow for the authorization system for this mobility, the HEIs have to accept?* *What are the main limitations/barriers for this mobility?*

According to a report of the World Bank entitled “Enhancing the contribution of Bulgaria’s public research to innovation”, Industry - Research mobility of staff in Bulgaria is rather uncommon, with only 1.3 % participating in staff exchange initiatives. This limits opportunities for networking and collaboration with industry and the general lack of linkages to industry represents a major challenge to knowledge exchange and tech transfer activities with the private sector.

5.2 Internationalization of Knowledge Transfer

Are there specific instruments for the internationalization of TT?

Some examples of instruments and initiatives supporting the internationalisation of technology transfer in Bulgaria include:

- Horizon Europe – the EU's key funding program for research and innovation, which aims to drive economic growth and create jobs. Bulgarian organisations can participate in collaborative projects with international partners, facilitating technology transfer and international collaboration.
- Enterprise Europe Network - helps businesses innovate and grow on an international scale. It provides services to help companies find international partners, enter new markets, and access funding. Bulgarian businesses can use EEN to connect with partners across Europe and beyond, enhancing their technology transfer capabilities.
- EUREKA network - intergovernmental network that supports market-oriented R&D and innovation projects. Bulgarian companies and research institutions can collaborate with international partners on EUREKA projects, fostering cross-border technology transfer and innovation.
- European Institute of Innovation and Technology - EIT brings together leading companies, universities, and research centers to form dynamic cross-border partnerships. Bulgarian organizations can participate in EIT Knowledge and Innovation Communities (KICs), which focus on specific societal challenges and promote the commercialization of innovative technologies.
- Bilateral and Multilateral Agreements - Bulgaria has bilateral and multilateral agreements with various countries to promote scientific and technological cooperation. These agreements often include provisions for joint research projects, technology transfer, and innovation partnerships.
- Innovation Norway - provides various programs to support innovation and business development, including opportunities for international collaboration. Bulgarian companies can participate in programs to access Norwegian expertise, funding, and markets.
- COSME – the programme aims to make it easier for SMEs to access finance and markets, including support for international business cooperation. Bulgarian SMEs can benefit from COSME to enhance their international technology transfer activities.
- European Space Agency (ESA) programs - Bulgaria is a cooperating state with the ESA. Bulgarian entities can participate in ESA programs, which often involve international cooperation in space technology and innovation.
- European Bank for Reconstruction and Development - EBRD supports technology transfer and innovation through various funding and advisory programs. Bulgarian businesses can access EBRD resources to enhance their technological capabilities and international presence.
- Clusters and technology parks - Bulgaria hosts several technology parks and innovation clusters that encourage international collaboration. These entities often have partnerships with foreign counterparts, facilitating technology transfer and international business development.

By leveraging these instruments and initiatives, Bulgaria can enhance its technology transfer activities on an international scale, fostering innovation and economic growth through global partnerships.

5.3 Tools Used to Publicize the Generated Knowledge

The main tool used by TTOs to promote their services and activities is through their websites. The websites of the TTOs identified within the study can be found in Section 3.2 "Map of Stakeholders".

5.4 Barriers to the Commercialization of Knowledge Generated in HEIs

The multi-stakeholder administrative and legal environment creates barriers based on the perceived risk of potential breach of some law or regulation, connected somehow to the commercialisation process and entrepreneurship, this barrier operates both at individual and at university level.

There is a general fear among a significant number of researchers about the use of public resources and infrastructure for R&D and business cooperation due to the perception that this is a potential breach of law or acts regarding the use of public property and consequent penal risk by relevant authorities.

Unclear policies and administrative procedure and protocol represent another barrier. Legislation and regulations often change, resulting in a lack of stability. Therefore, researchers often avoid formal contacts or choose to enter into contracts with industry only on private basis.

The majority of university professors consider as their main tasks teaching and research. The third mission consisting in development of IP, Commercialisation of research and creation of relevant "value" for their university and for society is not a clear mandate and in most cases seems to be unknown.

Furthermore, there are no incentives for TTO managers to participate in the success and proceeds that come to the university or R&D institution from their commercialisation efforts. So far, licensing and formalised IP assignment procedures are used very modestly.

5.5 TT Instruments Best Practiques

Technology Transfer Office of Sofia University - http://tto.bg/

The mission of the Technology Transfer Office is to act as a mediator between the university research departments and industrial enterprises thus supporting the transfer of scientific knowledge and technology, and to encourage the innovation and entrepreneurial spirit of scientists and researchers establishing a proper business climate in the university environment. More details about this best practice can be found in A5 "Research on Best Practices in Technology Transfer".

6 Economic Indicators and Funding

EU-funded programmes and national budget-based programmes are the main financing sources for funding R&D Commercialisation and TT.

During the previous programming periods several initiatives for supporting the creation and operation of TTOs took place. However, the majority of these TTOs have been closed or are de facto not operational after the completion of the programme and expenditure of the budget. This is a proof that the TTOs were perceived as projects and not as sustainable and long-term partners to the R&D and business community.

Under the Recovery and Resilience Plan, which is the main source of funding for the research activities, up to 10 per cent of this funding should be spent on Intellectual Property (IP) protection and TT. Main activities to be funded include capacity building and personnel; training of the personnel, researchers and students; transfer of knowledge; patent application and IP protection.

The R&D Sectors activity is funded by the state budget, national and international programmes (subject to successful projects applications), and contractual research with industry.

There are three sources of funding of TT and R&D Commercialisation activities for the current and future years, i.e. 2021-2027 programming period:

- The Structural Funds 2021-2027 Partnership Agreement, through the Operational Programme "Programme for Research, Innovation and Digitalisation for Smart Transformation", which acts as continuation to the Operational Programme "Science and Education for Smart Growth" (active in the 2014-2020 programming period). The programme has a total budget of BGN 2.14 billion and was approved by the European Commission at the end of 2022. The envisaged EUR 50 million Technology Transfer Fund (for equity) combined with additional EUR 10 million grant scheme (including Proof of Concept) is directly related with the TT ecosystem upgrade. A better integration with the stakeholders (TTO offices) might need to be planned at that stage, including the stronger involvement of the TTOs in the implementation process.;
- The National Recovery and Resilience Plan/Facility which is financing the specific project "An Agenda to accelerate economic recovery and transformation through Science and Innovation" through the Investment 1 "Programme to accelerate economic recovery and transformation through science and innovation"; Procedure for direct provision of grants "Establishing of a network of research HEIs in Bulgaria". Under this programme, for the first time, there is enough funding of international IP protection, and the money is allocated to the 10 Research Universities. The National Recovery and Resilience Plan (RRP), within Component 2 (Strategic research and innovation of BGN 413.2 million) includes a BGN 366.5 million programme related to Research and Innovation "An Agenda to accelerate economic recovery and transformation through Science and Innovation". This programme refers to the new Law for the Promotion of Research and Innovation as the basic legal tool for promotion of innovation and places emphasis on the strategic partnerships of R&D with industry. The programme envisages resources to finance its major pillar, i.e., the network of 10 Research Universities, has technology transfer at the centre of its interests, and relies on the Smart Growth Council for Governance and Coordination. Specifically, the programme provides support for personnel to strengthen the 10 universities' TTOs, intellectual property protection, start-ups, and applied research. The first calls for proposals to the Research Universities have already taken place (with a total budget of BGN 239.94 million) and was completed at the end of 2022.
- The expected next Tranches of the National Innovation Fund which has a key role in the new law on Promotion of Research and Innovation in relation to TT.

6.1 Distribution of the Budget Among the Involved Agents

So far in most academic institutions in Bulgaria little attention has been paid to the valorisation process of IP. However, as parts of the TU-Sofia and Sofia University regulations there are clauses protecting the interests of the inventors, i.e. researchers. They receive initially BGN 2000. For the successful patent/u.m. they can receive up to 50 % of the income in case of IP licence or sale. The spin-off option is a very recent opportunity for Bulgarian universities. Until very recently having a business of your own has been regarded as something negative in academic life. So, there are also cultural/social factors that inhibit the process and it will take some time for a change to happen.

In the case of medical universities, the income of patents and commercialisation goes back directly to the Ministry of Health. An example is the Institute of Infectious and Parasitic Diseases which does not even have an independent account although it participates in the Centre's projects and develops products and solutions. Similar concerns are valid for Medical Universities with Hospitals (Pleven), where there is practically no TTO activity although University hospital participates in research activities.

According to Article 15 of the Patents and Utility Models Registration Act, the inventions made as a result of employment contracts belong to the employer unless other conditions are preliminary agreed. The inventor has the right to "fair" compensation considering the income produced during the lifetime of commercialisation of the patent, the value of the invention as well as the contribution of the employer with materials and other resources.

The IP Statutes of most universities clarify further these provisions and provide researchers with the right of compensation in case the right is taken by the university and then commercialised.

In Decree No 61 of the Council of Ministers of 02.04.2020, which lays down the procedure for the establishment of commercial companies by state-owned higher education institutions for the commercialisation of scientific results, research, and IP objects, there are no provisions for the inventors/researchers to receive/hold equity (which hinder the development of spin offs by universities).

7 Human Resources and Training

Typically, there are only one or two persons permanently employed in most of the TTOs. In many cases they have legal background and are able to provide mostly administrative support, consultancy and training. Bulgaria's Patent Office collaborates very actively with Bulgarian universities providing trainings of academic and non-academic staff and consultancy when required.

8 Relationships Between the Agents of the Ecosystem

Although cooperation between research organisations, HEIs and business in Bulgaria seems to be relatively limited and inefficient, resulting in low levels of technology and knowledge transfer and commercialisation of R&D, there are some examples of successful cooperation between the different actors from the TT ecosystem.

As a member of the European University of Technology (bringing together technical universities from 9 EU member states – Bulgaria, Cyprus, France, Germany, Ireland, Italy, Latvia, Romania and Spain), TU Sofia is part of its Technology Transfer structure, called EUt+ Innovation and Technology Transfer Office (EITTO). TU-Sofia has also led the creation of "Campus Studentski Grad" with multiple new laboratories and services for the industry.

The Medical University of Sofia has gained some track record in collaboration with industry and also intends to build stronger capacity in Technology Transfer catching up with the other Medical Universities which participate in the Centre's projects.

Plovdiv Medical University jointly with Plovdiv University have made progress in the past years based on the ERDF co-funded Centre PERIMED.

The Research and Development sector of Ruse University is involved in several collaborative research projects with industry. At present there is a substantial part of research funded by industrial companies. Together with the local Municipality and business, the TT centre of Ruse

University works towards creating a local ecosystem facilitating the technology transfer. Substantial part of these activities are regular trainings, workshops, video series with internationally recognised associations, such as WIPO. Further, Ruse University collaborates actively with the Ruse Chamber of Commerce and Business support centre for SMEs. Ruse University has been part of the Danube Transfer Centres Network allowing the exchange of good practices with TT teams in other countries.

As a member of the recently established Gabrovo Tech Park, Technical University - Gabrovo is working in close cooperation with the Municipality of Gabrovo and representatives of the local business . At present there are 18 laboratories within the framework of Gabrovo Tech Park. Driven by the desire to further develop the local ecosystem they collaborate tightly with Sofia Tech Park and are showing a proactive attitude towards the transfer of knowledge and good practices. The first results of this developing ecosystem are 17 contracts with six local companies and one contract with a company from abroad.

Shumen University has contracts with 27 companies from the Shumen Industrial Zone. Collaboration with industry is mainly in the field of students' training and internships.

9 Public Administration

Three different ministries and state institutions are involved in the value chain from R&D to commercialisation:

- The Ministry of Education and Science: responsible for Universities, R&D, and Science. Also responsible indirectly for CoEs, CoCs mainly developed by Universities, and Bulgarian Academy of Sciences;
- The Ministry for Innovation and Growth, with its several structures for Innovation, Commercialisation and TT; and
- the Patent Office (which itself is a second level spending entity to the Ministry of Economy and Industry): responsible for IPR.

The strong coordinating role of the Ministry of Innovation and Growth is apparent both in the Bulgarian Parliament Act from December 2021 to form this new Ministry, as well as in the detailed structural rules of procedures of this Ministry.

In addition to the two main Ministries referred above, the Ministry of Economy and Industry is also involved in the technology-related economy, being shareholder of Sofia Tech Park as well as supervisory Authority of Agencies related to Technology Investments (such as the Bulgarian Small and Medium Enterprises Promotion Agency - BSMEPA and Foreign Investments Agency - FIA). Some other research Institutions are active under other Ministries, (as e.g. the Ministry of Health, Ministry of Defence, Ministry of Agriculture, Ministry of Electronic Governance) which have a specific knowledge basis of practical and TT interest.

Finally, the National Patent Office of Bulgaria, a competent organisation with strong legacy in the IPR scene in Bulgaria, is a major pillar of the institutional framework of the country and is coping in the last years with the challenge of a growing activity in patenting and the effort to engage in a stronger way the Universities in IP development.

An Innovation Council, bringing together Business and Academic Community and linking both with the Ministry of Education and Science and Ministry of Innovation and Growth, will be called in to support the creation of policy and practical bridges between the two worlds.

10 Conclusions

Bulgaria's TT/IP institutional system is presently under full development along different levels and with different legal and institutional initiatives. In order for the strategic goals and plans to materialise and bring optimal results for the economy and people, several issues remain to be addressed. These include overcoming the fragmentation in TT capacities' creation; reducing the persisting ambiguity in regulatory and policy-coordination frameworks; attracting and retaining human capital; regulating and intensifying academia-industry collaboration, establishing a sustainable TT ecosystem. Sufficient national public funding for basic research should be dedicated under the national budget to produce the scientific results to be transferred to industry. The proper implementation of the experts' recommendations shall reduce risks of overlaps, inefficiencies and oversaturation in financing for TT, help increase the absorption capacity in R&D&I, and ultimately enhance the country's overall innovation performance.

Among the key recommendations are enhancing policy coordination and commitment; making several adjustments into the recently adopted Law on Promotion of Research and Innovation; incentivising and placing inventors in the centre of the ecosystem; formalising the possibility to own equity in institutional spin-offs; adjusting the size of investment tickets for both sub-funds under the planned TT VC Fund; and a new overall scheme for TTOs optimising their number, distribution and reducing regional disparities.

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