



FINAL REPORT

Peer review for the Executive Agency "Programme Education"
Policies and activities for knowledge and technology
transfer and use of research infrastructure by
Centres of Excellence and Centres of Competence

14-15 December 2021

1. Background

Scientific research is a national priority in Bulgaria and it is of strategic importance for development of the country. Currently, Bulgaria is ranked as a Modest Innovator in the European Innovation Scoreboard, with a performance level of 49 percent of the EU average. According to the 2020 European Semester: Country Report, Bulgaria's research and innovation (R&I) system faces structural shortcomings such as low level of public and private R&I investment, fragmentation of the public science base, lack and ageing of skilled human resources, weak science-business links, which are still insufficiently developed to support knowledge and technology transfer. This hinders the required capacity building, as research infrastructure needs renovation, and scientific career is still not attractive for young talent.

To tackle fragmentation and increase performance of the research and innovation ecosystem, the Science and Education for Smart Growth Operational Programme 2014-2020 supports projects for creation of 6 Centres of Excellence (CoE) and 10 Centres of Competence (CoC) by the end of the year 2023 through the European Regional Development Fund. The Programme is managed by the Executive Agency "Programme Education" at the Ministry of Education and Science of Republic of Bulgaria.

The activities of the CoEs and CoCs are focused on the thematic areas of the [Innovation strategy for smart specialization of Bulgaria 2014-2020](#): Mechatronics and Clean technologies, Informatics and ICT, Healthy life industry and biotechnologies, and New technologies in creative and recreational industries. The major goal of the supported actions is to enhance the level and market orientation of the research activities of the leading scientific organizations in Bulgaria. The centres aim to create the best possible conditions for attracting highly qualified researchers to conduct top level research at European scale in RIS3 priority areas and to improve significantly the potential of the country for applied research, experimental development, and technological innovations. CoEs and CoCs are intended to turn into leading research organisations in Bulgaria, supporting the development of the other participants in the innovation ecosystem through their unique research expertise and by training top specialists in the RIS3 areas, and to increase the scientific impact and market-orientation of the Bulgarian research organizations and their ability to attract private investment by improving their capacity for generation of research excellence and innovation capacity in the priority areas of RIS3.

The projects are elaborated based on the partnership principle (including different number of project partners, between 3 and 17), involving more than 60 research organisations (universities, scientific institutes, public organisations and NGOs). The centres have dispersed infrastructure in different locations within a city or in different cities in the country. They envisage three main groups of activities: modernization of existing scientific infrastructure and building of new scientific infrastructure; implementation of research and development activities; dissemination of the research results, knowledge and technologies transfer and supply of research services for the business.

2. Motivation to call for an interregional peer review

Given the size and complexity of the CoEs and CoCs and the challenges the beneficiaries have been facing from the very beginning of the project's implementation, the efforts of the Managing Authority have been accordingly targeted at supporting smooth and successful creation and development of the centers. Currently, the activities related to establishment of research infrastructure of the centers are well advancing, and the focus is gradually shifting towards their scientific programmes, future functioning and sustainability.

Technology transfer is one of the cornerstones of the future successful development of the centres and is a very important area and prerequisite for success, which needs to be paid special attention to. In Bulgaria, technology transfer activity is relatively underdeveloped. The community of researchers is still lacking technology transfer knowledge and skills. The transfer of innovation outputs from the public sector into private sector is limited by a lack of knowledge about technology transfer practices and procedures, shortage of funding for intellectual property protection and technology transfer activities, and insufficient incentives for public researchers to commercialize their work.

Based on the needs analysis among the stakeholders, the Managing Authority has identified that the policies and activities for knowledge and technology transfer of the CoEs and CoCs need to be reviewed and optimized at this moment of project implementation in order to lay the grounds for their sustainable development. It is of utmost importance to ensure that the centres will be able to operate as competitive and internationally recognized research complexes in the areas of interest to the Bulgarian economy and will strengthen business orientation of the research, serving the technology transfer needs of the Bulgarian market. For that reason, it is important to study and apply good practices on the ways in which technology transfer can take place in the context of ERDF-funded research infrastructures (e.g., developed with public resources).

Most of the funded projects for establishment of CoCs and CoEs address the technology transfer as a second or third phase in their development (after establishment of the scientific infrastructure and implementation of the main research activities). The described measures, however, are rather theoretical. Beneficiaries do not have clear and precise vision of how this process will be implemented in practice, as currently in Bulgaria technology transfer activities in general are comparatively low. Some of the projects already include technology transfer offices as partners, intended to be used for their experience and contacts at national and international level in order to support the technological transfer of scientific products, but this practice is rather limited and the centres need to explore good practices on how technology transfer can help them develop and be more sustainable in the long run. The level of development of the different technology transfer offices is also varied, with some being much more advanced and ambitious than others. The entire process of technology transfer in Bulgaria needs further streamlining and building on successful European models of functioning and interactions.

In this context, but also with a long-term perspective, the Managing Authority has considered it very important to build on previous initiatives for interregional learning and has sought expertise and exchange of good practices of established CoE/CoC with similar profiles in Europe. This approach allows to receive practically-oriented feedback from other European regions on the specific needs related to knowledge and technology transfer of the centres and recommendations on particular measures for ensuring their successful future functioning. Through the requested external experts' support, sharing experience and identifying specific measures for technology transfer, the MA has aimed to accelerate this process and channel it so as to meet the needs of the beneficiaries (scientific organizations).

The Managing Authority highly appreciated the opportunity for hosting the peer review under the Interreg Europe Policy Learning Platform, which has been of valuable benefit for the Bulgarian research institutions and decision-making authorities.

3. The peer review

After approval of the request for expert support and preparation of the background paper containing overview of the political and institutional context, the policy challenge faced, and the policy questions to be addressed, the Interreg Europe Policy Learning Platform made a selection of peers with expertise in

setting up and supporting the running of CoC and CoE and in technology transfer within the work of CoC and CoE. Experts from Finland, Czech Republic, Spain and Netherlands were selected representing various fields of professional experience. One of the experts was involved in the previous peer review on structuring CoEs and CoCs, which was held in Sofia in 2019, and contributed to continuity of the interregional learning support provided to the Managing Authority and the beneficiaries.

Four peers have been involved in the peer review as well as two Interreg Europe Policy Learning Platform experts:

Leena Sarvaranta	Former Head of EU Affairs at VTT Technical Research Centre, Finland
Markus Dettenhofer	Former Executive Director of CEITEC, CZU - Senior Scientist, Czech Republic
Alaitz Landaluze	General Coordinator of Innovation Policy, Basque Innovation Agency, Spain
Pieter de Jong	EU Representative, Wetsus, Netherlands
Marc Pattinson	Thematic Expert in Research and Innovation, Interreg Europe Policy Learning Platform
Thorsten Kohlisch	Project Manager, Interreg Europe Policy Learning Platform

The peer review agenda elaborated by the Interreg Europe Policy Learning Platform and coordinated with the Managing Authority was structured in a way to ensure comprehensive understanding of policy challenges and overview of the policies and activities for knowledge and technology transfer and use of research infrastructure by the CoEs and CoCs in Bulgaria as well as involvement of the stakeholders in interactive discussions on policy questions addressed. Preliminary online meetings with the Interreg Europe experts contributed to good preparation on these issues and effective implementation of the tight agenda.

Due to the COVID-19 pandemic restrictions, the peer review was held online via an electronic platform provided and hosted by the Interreg Europe Policy Learning Platform. In order to facilitate the exchange and discussions, simultaneous interpretation was ensured for the participants.

The key stakeholders have been beneficiaries of CoCs and CoEs, and for the purpose of the peer review six most advanced projects for creation of CoCs were invited. The representatives of these projects presented the challenges to manage technology transfer cooperation and the related legal issues as well as their perspectives on how to engage with the business. Through involvement of stakeholders from CoCs, the peers got thorough insight in the challenges from the beneficiaries' point of view.

The peers shared their experience on technology transfer, motivating and engaging with SMEs and dealing with legal aspects including intellectual property issues. The examples from peer regions provided by them were appreciated by the participants and served as a starting point for exchange of views on the possible solutions and the way forward in ensuring technology transfer activities of the centres. The discussions between the Interreg Europe Policy Learning Platform experts, peers, stakeholders and representatives of the Managing Authority highly contributed for gaining comprehensive understanding of the policy setup and faced policy challenges. This approach helped for common understanding of the challenges to be tackled and provision of relevant and practically-oriented recommendations.

4. Policy recommendations

As a result of constructive discussions, a set of specific recommendations on each policy question were provided accompanied with practical guidance and examples:

1) How to increase the capacity to identify technologies of interest to businesses and industry in general?

Recommendation 1. Target: CoC/CoE

What: Finding the intersection between technologies being developed with the business demand

How: 1. Map the existing research and technologies within the partners of the Centres. Assess level of 1) innovativeness and 2) technology/solutions readiness/TRL. 2. Map, catalogue and understand local/regional business domains/fields, using business intermediaries/clusters and willingness to try new solutions. Present results on Centre websites, databases ... Provide access/contact details.

Recommendation 2. Target: CoC/CoE

What: Strengthen relationships between business community and researchers/centres

How: 1. Invite business community to the Centre to present their R&D/technical challenges together with the targeted researchers. 2. Have the centre representative(s) work to develop know-how sharing activities, potentially through joint research, maybe on non competitive fields, first.

Recommendation 3. Target: CoC/CoE

What: Gain experience in connecting technology development with industry demand

How: 1. Recruit external researchers who are more application-minded. 2. Initiate short-term exchange of students with industry and/or bring industry representatives and industry scientists for secondments to centres.

Recommendation 4. Target: CoE/CoC

What: Make sure to have the science and business skills/competences well-represented in the teams. They will bring in complementary viewpoints. Make sure to have preferably some PhD graduates within your staff, if possible with technical and business knowledge and skills.

Management models: Consider inviting business and business networks in advisory board roles as opposed to the management board to avoid conflict of interests.

Consider the approach of the sub-thematic groups deployed by Wetsus to facilitate business inclusion in an operational, concrete and collaborative way.

Recommendation 5. Target: CoC/CoE and future TTOs ...

What: Internationalisation actions – extend your ecosystem and “neighbourhood” of potential partners and clients through cross-border networks and platforms

How: Make use of cross-border and transnational Interreg programmes to allow the CoC/CoE and TTO to extend their networks with potential business and research partners across the border.

Example: [HYPEREGIO EarlyTech project](#) funded by the Interreg Programme “Euregio Meuse-Rhine” (Belgium, Germany, the Netherlands), supporting cooperation between TT managers, cross-border technology events as well as vouchers for cross-border S2B cooperation.

Equally, consider Interreg B (transnational programmes) for the development and testing of innovative voucher schemes.

Recommendation 6. Target: Policy makers, i.e. Bulgarian S3/ISSS implementation groups

What: Consider launching groups, one in each thematic area, to coordinate and implement the Bulgarian Innovation Strategy for Smart Specialisation (ISSS) – in consultation with relevant (new) Ministries

- Goals:
 - Define the science and technology areas of interest. Discuss about the needs of the local business sector, the international future trends of the sector and the capabilities of the CoE and the CoC.
 - Identify needs to develop the identified areas (training, new infrastructures, etc.).
 - Promote collaboration projects in the identified areas between the business sector, the CoE/CoC.
 - Communication and dissemination activities to stimulate local businesses about the opportunities behind the identified science and technology areas, projects and results.
- Members:
 - Ministry of Innovation and Growth
 - Main companies and business associations, including clusters
 - CoEs and CoCs
- Example: [Implementing RIS3: The Case of the Basque Country](#)

Recommendation 7. Target: Policy makers and CoC/CoE

What: Increase horizontal collaboration and joint foresight activities between different thematics and also policy domains.

Analyse the interlinkages between technology domains to enhance cross sectoral collaboration and innovation opportunities. Engaging with key EU initiatives such as the EU Industry Strategy (Industrial Forum, ERA Forum for Transition / Technology Roadmaps, Recovery and Resilience Plans) can provide interesting elements to enhance knowledge.

Recommendation 8. Target: Policy makers

What: Offer a “carrot” for collaboration across research and industry.

Consider how a special-purpose funding authority/agency could be used to provide incentives to encourage and “push” for collaboration between research and industry practitioners.

The Ministry/Agency could offer a mix of direct and competitive R&I funding, with international evaluation panels and appropriate KPIs to drive such collaboration. Funding could reflect other policy objectives such as being prioritised for cross-disciplinary and industry-relevant activities.

Exchange/join TAFTIE (National Innovation Agency network: peer activities in other Member States).

2) How to properly manage the innovations that arise as a result of project research activities?

Recommendation 1. Target: CoE/CoC and policy makers

What: A centralized office or NGO or similar structure with dedicated team is set up to specifically charged with handling technology transfers for each of the CoC/CoE (consider scope for some thematic regrouping)

How: 1) Find/hire skilled personnel with experience from abroad, but can relate and will be accepted in the local context and facilitate exchange between partners. They will handle the core activities (legal/business development) centrally. 2) The centres could then have “scouts” connecting with the researchers within the centres, and acting to encourage and develop entrepreneurial mindsets.

Recommendation 2. Target: CoE/CoC

What: Consider establishing a functioning office for technology transfer within each of the CoE/CoC

How: Develop: 1) templates for the series of standardized agreement forms, 2) a digital database of technology developments and business contacts with their areas of specialized interest, 3) people skills to stay engaged with stakeholders through skills training events, business round-tables, student pitch events, etc., and 4) a go/no-go scheme for deal decision-making (e.g. file IP, contracted fee-for-service, know-how sharing agreements).

Recommendation 3. Target: ALL

What: Benchmark against other similar offices in Bulgaria and abroad

How: 1) Develop a network or association of similar offices (additional advantage: could write joint grant calls together). 2) Categorize the functions of the office (e.g. personnel, financing, deal-flow, out-reach, data-base development, etc.) based on efficiency and professionalism. 3) Exchange experience with peer network. 4) Receive feed-back (informally), through a user committee composed of scientists and companies. 5) Periodically, conduct a formal review with external advisors.

Recommendation 4. Target: CoE/CoC

What: Invest in skills and capacities of your TTOs

How: Offer staff exchanges for your TTO experts in TTOs abroad (you may use the peer network mentioned in the recommendation above).

Example: [Practical guidance document](#) for the practical implementation of different staff exchange models (from the Interreg context) published by Interact.

Recommendation 5. Target: CoE/CoC

What: Make sure to have an agreed and “centralised IP policy” for each Centre

How: Preferably ensure this is in place BEFORE you start a research project. Make sure all partners have agreed to the policy before spending money or sharing IP or company knowledge.

Recommendation 6. Target: Both CoE/CoC

What: Financing Mix

How: Bridge the Valley of Death by ensuring a balanced mix of public funding for scientific research (TRL 0-1/2), applied research (TRL 2-5/6) and close-market development (TRL 6-8). Encourage private/VC/accelerator funding vehicles for higher TRL funding. Target scale-up funding, for example Pillar 3 of Horizon Europe – European Innovation Ecosystems – competitive funding models.

Recommendation 7. Target: Policy makers and CoE/CoC

What: Increase the absorption capacity of the business sector

There are different type or technology transfer activities. From the easiest to the hardest:

1. Dissemination and training
2. Research contract
3. Licencing and patenting
4. Spin-off

Funding: Bulgarian Government can promote research contract activities between the business sector and the CoC and CoEs, implementing a grant programme for R&D projects in ISSS thematic areas for businesses.

Incentives: Look at non-competitive research and innovation activities with clusters/business networks: use of vouchers.

Collaboration criteria: The programme could have as a condition the hiring of CoC and CoE (example: 20% of the budget).

Example: [Hazitek – Grant program for Business R&D](#) example from the Basque Country (see following slide)

3) What is the best and most efficient way to settle ownership of the research results and benefits of the projects between all partners, including intellectual property rights?

Recommendation 1. Target: MAs and CoE/CoC together

What: Strengthen the professional management practices overall in the Centers

Internal management practices are linked with public status/mission, levels of basic/competitive funding, and autonomy/accountability/governance of the institution.

Make a clear contract for all private sector participants and one for research institutes. Then the agreement is transparent and everyone is treated equally.

Recommendation 2. Target: MAs and CoE/CoC together

What: Analyse and adopt EU policies and practices to avoid the “reinventing the wheel” syndrome

Examples of some relevant examples/sources: Training for collaborative project plans, Model Grant Agreements and IPR rules in HEU Pillar 2, RDI State Aid Framework adapted to Green Deal objectives...

4) What are the most appropriate contemporary forms and models of technology transfer for the needs of the Bulgarian centres?

Recommendation 1. Target: CoC/CoE

What: Strengthen the market-driven approach of CoCs

Suggest this is by including relevant Bulgarian industry networks and/or clusters in the governance and decision-making structures of CoCs.

Recommendation 2. Target: MAs and CoC/CoE together

What: Connect CoC with relevant research networks, technology roadmaps and industrial value chains at EU level

By ensuring adequate matching funds for participation in HEU Partnerships and engaging the Bulgarian Programme Committee Members and NCPs in Horizon Europe (Pillar 2) for mapping the opportunities. Also consider connecting with/participate in EARTO (peer activities in European RTOs).

Below a web page where to find statistics on a yearly basis:

<http://www.researchranking.org/?year=2020&action=country&country=BG>

Recommendation 3. Target: All

What: Consider a sector specific approach for technology transfers (eg. Biotech, engineering, ICT)

How: Understand which sectors in the region can benefit most from patent protection, as not all do.

Recommendation 4. Target: All

What: Support the development of innovative service-based businesses

How: Mini-grants from the region to help establish such entities. Advantages are: revenues early on; creates jobs for the region; know-how is gained with every contract; revenues can be used to build up capacities.

Recommendation 5. Target: CoC/CoE and TTOs

What: Develop the students as the future leaders of new R&D intensive businesses

How: 1) Establish soft skills training programmes and seeding grants to encourage students to establish businesses. 2) Encourage the further potential to work together with the Centre from where the ideas came from (support preparing the ground for future public-private engagement); if successful the companies will hire alumni from Centre.

Recommendation 6. Target: CoC/CoE

What: To whom should the patent rights belong to, the CoE/CoC? Several practices and examples where they are transferred to company partners and policy makers support and showcase outstanding innovations with prizes and awards.

Award scheme: The involved researchers, especially PhDs can automatically participate in an annual competition which rewards the PhD student with the most outstanding innovation achievement.

Example: The Wetsus PhD Prize (for projects with a patent): Marcel Mulder Prize:

<https://www.wetsus.nl/news/emad-al-dhubhani-wins-marcel-mulder-prize/#:~:text=Emad%20al%2DDhubhani%20has%20won,at%20the%20Wetsus%20congress%202021.>

Youtube: <https://www.youtube.com/watch?v=bHZNDEAEGCE>

Recommendation 7. Target: Policy makers and CoC/CoE

What: Result-oriented structural funding with clear indicator scheme can be relevant in supporting the Centers' focus on technology transfers

To maximize the results of the CoCs and CoEs, it is proposed to periodically evaluate their performance and condition their structural funding based on it.

The starting point would be the definition of the mission and characteristics of CoCs and CoEs and a common indicator scorecard for all of them.

Then it will be necessary to define the weight and target for each indicator. There would be two models, one for CoEs and another one for CoCs.

Benefits and Results:

- Monitoring of the evolution of the centers
- Transparency of the evaluation criteria of the centers for future decision making
- Benchmarking between centers

Example: [Decree regulating the Basque science, technology and innovation network](#)

In addition to the above recommendations, the stakeholders and the Managing Authority received some proposals for continuing and deepening the launched cooperation:

Proposal 1 – Make use of European funding and networking opportunities

- Identify how CoE/CoC has a relevant legal structure for the participation in EU programmes, for instance via the lead partner (University, Institute ...).
- Network at EU level. Try to join sessions organised by the ERRIN organisation (www.errin.eu). Join info days regarding your topic. Have a broad look at other collaboration opportunities such as interregional collaboration through RIS3. Connect with the Science department of your Permanent Representative in Brussels (EU Embassy of Bulgaria) and connect with your regional EU representative.
- Consider to establish a robust pre-award grant office to engage more with the European funding schemes.

Proposal 2 – Team up with other RTOs

- Utilise peers to access RTO's VTT, Tecnalia and Wetsus: focus on thematic linkages and EU funding opportunities, participation in advisory boards, technology roadmaps, etc.

Proposal 3 – Establish international consortia with other EU institutes

- Bulgarian institutes should establish international consortia as a long-term proposition, together with other EU institutes in similar areas of investigation. This would be a foundation for future collaborations, grants, and exchange of personnel.

Proposal 4 – Establish an external advisory board and use the support offered by the peers

- Establish an external/international advisory board, not only for technology transfer, but broadly addressing institutional development. The peers would be very willing to help in this effort!

The recommendations and proposals were presented to the stakeholders and the key decision-makers (Ministry of Education and Science and the Managing Authority of the Programme for research, innovation and digitalization for smart transformation, which will take over the actions for further development of the CoEs and CoCs in the 2021-2027 programming period).

5. Conclusions and follow-up

The above outputs clearly indicate the effectiveness of the chosen approach for the peer review. The active involvement of all participants allowed the peers to get a deep insight into the challenges faced and provide actionable recommendations arising from the specific experience in other EU regions.

The peer review gave the beneficiaries who are part of the projects for the creation of CoEs and CoCs and the Managing Authority the opportunity to look at the issues related to technology transfer, which is one of the key prerequisites for the future successful development of the centres, from the perspective of practitioners in the field. The research organisations have been benefitting from good examples of operationalized policies and procedures for strengthening capacity to identify and manage technologies serving the interests of the science and business from similar centres in other countries. The recommendations provided have outlined specific actions to be taken and sources of proven knowledge and approaches to be used.

In order to use the opportunity for multiplication and spillover effect of the results, just after the peer review the Managing Authority published information on the Programme website: <http://sf.mon.bg/?go=news&p=detail&newsId=1014>. The recommendations were also made available for the public: <http://sf.mon.bg/?go=page&pageId=451>.

The Managing Authority considers that the received external expertise and recommendations to some selected centers could be applied to the other projects as well. That is why the recommendations were officially communicated with all CoEs and CoCs, and they were invited to take them into consideration in the implementation of their scientific programmes.

The insights gained from the experience in other countries and advice received have been already used within the Managing Authority in the ongoing internal evaluation of the implementation of projects for the creation of CoEs and CoCs. They also serve in the process of monitoring the projects activities for technologies transfer and supply of research services for the business. After the peer review individual meetings with all centres were organized to enable an open discussion on the progress in the projects' implementation, including the preparation of sustainability plans. The beneficiaries expressed their positive attitude to the peer review recommendations that serve as a useful source for some specific measures to be envisaged in their planning for the future plans of the centres.

Last but not least, the cooperation with the peers could be continued through some follow-up actions of common interest.