

EXECUTIVE SUMMARY

I. Background and context

Bulgaria seeks to improve the national potential for applied research, experimental development, and innovation.

Bulgarian science is strong in physics, chemistry, biological science, and engineering. Key stakeholders recognise that the industries of the 21st century will depend increasingly on the generation of knowledge through creativity and innovation. Hence, traditional sectors of Bulgarian science are now combined with achievements in ICT and automation. Specific ‘smart’ sectors where Bulgaria possesses the potential to make breakthroughs have been identified and included as “vertical priorities” in the Smart Specialisation Strategy (S3) 2014-2020: Informatics and ICT, Mechatronics and CleanTech, Industry for a Healthy lifestyle and BioTech, and Creative and Recreative industries. The strategy also has two horizontal priorities: (i) resource efficient technologies and (ii) digital technologies.

Significant funding from the European Regional Development Fund (2014-2020) has been dedicated to the national priority axis (theme) "Research and Technological Development".

New research complexes established under the "Science and Education for Smart Growth" Operational Programme (SESG-OP) – including Centres of Excellence (CoEs), Centres of Competence (CoCs) are going through three stages: synchronisation (2017-18), building (2019-20) and development (2021-23). Total funds allocated for the Centers amount to approximately EUR 190 million. As per the current regulation less developed regions, which is the entire territory of BG in 2014-2020 period, are co-financed with 85 % ERDF funds¹. The investment per CoE/CoC project is roughly between 13 and 69 million BGN with an average of about 25 million. Cohesion policy already invests largely in research infrastructure in Bulgaria, co-financing the creation of the flagship Sofia Tech Park project.

Bulgaria faces some policy, structural, and institutional challenges that must be addressed to improve its innovation performance in the EU and globally.

The lack of integrated policy instruments, including effective mechanisms to support shared infrastructures, limits the advancement of research and technology. These instruments are key to stimulating public-private collaborations and help create and foster markets.

Bulgaria’s Research and Innovation (R&I) system faces a number of structural shortcomings. These include low levels of public and private R&I investment, fragmentation of the public science base, lack and ageing of skilled human resources, weak science-business links and inefficient governance.

Overcoming existing challenges

The overarching strategy of all CoEs and CoCs is strongly focused on scientific research excellence and less so on commercialisation, market orientation, innovation capacity-building, or self-sustainability. As a result, the activities envisaged for the Centers will significantly rely on public funding. Traditional activities of research and development (R&D) institutions, such as applied

¹ Regulation 1303/2013 for further details

(predominantly contract) research and more complex collaborative research as means to develop or strengthen relations with industry and knowledge transfer, are currently not sufficiently utilised by the majority of the Centres' partner organisations.

In Bulgaria, technology transfer activity is still relatively limited. Several technology transfer offices (TTO) have been established, some of which are operational and slowly gaining momentum. The community of researchers is still lacking TT knowledge and skills. Various strategies on IP exploitation exist, however they are still nascent.

As part of their applications for funding, all Centres had to prepare research and innovation programmes; however, the planned actions are more generalist in nature and not sufficiently industry or market specific. This lack of clear, actionable objectives and specific steps required for each Centre to achieve the status of regional and national importance will need to be rectified at a minimum by:

- (1) A development strategy that defines a clear scientific and innovation agenda aligned with the priority areas of the European market and with regional specifics;
- (2) Innovation and technology transfer action plans that includes deeper and more comprehensive market analysis, competition analysis, services portfolio definition, talent acquisition and skill development, and;
- (3) An industry collaboration strategy to create and grow structured collaborations with industry, customers and end-users of the technology.

II. Strategic messages to the Bulgarian government

Public intervention in the research sector in Bulgaria must be optimised. The role of government is not only to provide the Centres with funding but also to create conditions for developing a R&I ecosystem that can serve as a means of enhancing economic performance. A range of policies, initiatives and mechanisms are required to support and enhance the long-term sustainability of the CoEs and CoCs. Creating the right conditions will be critical in enabling the national innovation potential and success of the Centres.

The Bulgarian government is currently in the process of consolidating its efforts in the R&D&I domain by establishing a State Agency for Research and Innovation – a body directly accountable to the Council of Ministers and aiming to address the lack of adequate institutional policy-making framework. It is recommended that the new Agency implements a **centralised, strategic and well-coordinated government policy directed strongly towards capacity building, targeted as well as facilitative measures to support academia-industry collaboration and technology transfer**. In this regard, the Agency's mandate should take into account the needs of and opportunities for the ongoing 14 CoC and CoE projects and could serve as an overarching organisation by pursuing a proactive and coordinated policy, including to undertake the necessary reforms, towards all publically funded research organisations and research infrastructures in the country.

A public body in the form of a **centrally coordinated and capacitated network with the mission to encourage academic collaborations with industry and technology transfer** could be one effective option to better organise the research system in Bulgaria. This will increase the exposure and **awareness about the Bulgarian R&D&I capacity**, facilitating the integration of the Centres into the Bulgarian innovation ecosystem and the creation of expected value added. Equipment, human capital, competences and capacities, services offered, described simple procedures and most importantly some success stories should all be made available to interested parties such as users,

investors and collaborators in order to initiate and streamline the research and development activities in the public sector in the country.

The recent changes in the Law on Higher Education made it possible for the **Minister of Science to agree with the rectors their tasks and strategic objectives together with the provision of targeted funding** to realise these objectives. These objectives should include the encouragement of collaborations with industry and in parallel technology transfer activities across the Bulgarian ecosystem. These are the core prerequisites for the sustainability of the projects for Centres of Competence, in particular. On the other hand, the **public block funding dedicated for independent research should be itself sufficient to guarantee continuity in pursuing excellence.**

Furthermore, technology transfer could be incorporated in the Law on Higher Education and linked to the activities of the newly designated (with the recent amendment of the law) **“research-intensive” higher education institutions** (Article 17a). For these institutions, the government could consider **designing specific stimuli such as funding for Proof of Concept and for spin-off creation** to incentivise the commercialisation of their inventions, as well as **programmes for supporting effective collaboration** between research organisations and industry. In the medium-to-long term, the research organisations should build strong capacities for interaction with industry. An amendment of the Law on Promotion of Scientific Research could also be considered to reflect the new instruments.

One of the challenges of the Bulgarian Academy of Sciences (BAS) in delivering technology transfer activities effectively remains in the organisational setup where the various BAS institutes are legal owners of the IP. The experts are of the opinion that the existing **Joint Innovation Centre at BAS**, in association with the individual teams at the BAS institutes, **should be strengthened.** In particular, its role for commercialisation and technology transfer should be enhanced so that it can more effectively **serve as a central hub to the institutes facilitating their participation in the various CoE and CoC projects.** This participation in multiple Centres necessitates the consolidation of capacities and streamlining of processes through a structural reform, update and adjustment of the Academy's industry collaboration and technology transfer policies, practices and arrangements.

Overall, there are no major obstacles for technology transfer in the Bulgarian legal framework in which the Centres operate and much depends on the **institutional motivation, competence, commitment and budgets of each research organisation.** Certainly, a **carefully designed national mechanism would be beneficial** to improve coordination and build capacities.

As the buildings and equipment procured under the Centre-projects remain in the ownership of the research organisations (as per the experts' recommendations), the **rectors and BAS institutes directors should commit to ensure that the research infrastructure received under the Centres-projects is made available for the purposes of these projects.** The agreed work packages in each Centre - in both aspects division of work and collaboration between partner organisations - will naturally serve as cornerstones in the organisational structures of the Centres and facilitate the latter's continuous operation also beyond 2023.

While at the moment the National Roadmap for Research Infrastructures recognises “research complexes” as eligible for funding, it would be useful that the Bulgarian government further explores the needs and opportunities to formalise the existence of the CoCs and CoEs, including as separate legal entities. These Centres are entrusted with specific R&D&I activities, possibly including not only coordination functions but also the management of research infrastructures where applicable. Moreover, they would be one of the backbones in the plan for transformation of the Bulgarian

economy and it is foreseen that the future Programme for Research, Innovation and Digitalisation for Smart transformation will continue their funding in 2021-27 period as well. Therefore, it is of utmost importance to ensure that all prerequisites and mechanisms for the Centres' sustainable development are firmly put into place.

III. Recommendations to the Centres and the founding partner research organisations

A sustainable path forward

1. Legal Structure for the Centres

Legally, the CoEs and CoCs have a flexible initial set-up, which provides possibilities to apply a different legal structure and incorporate dedicated entities with own legal personality. All Centres have initiated their operations based on and within the framework of Partnership Agreements defined for this purpose, with one Centre also incorporating an association. Almost all Centres will clearly benefit from the creation of separate legal entities, with a degree of autonomy, entrusted with the development of the common interest of the partner organisations within the Centre-projects. The proposed legal entities are generally divided in two broad groups:

- “facilitators” where some particular activities are entrusted to professional independent teams such as coordination, representation and promotion of industry collaboration; and
- “fully integrated governance structures” where Centres become even more integrated and empowered organisational structures capable of also managing the research infrastructure.

Thus, looking ahead, especially in the period after 2023, the Centres should establish a clear institutional setup, on a more permanent basis than the current consortia, with professional management and staff entrusted through clear rules with responsibilities to support or respectively lead the sustainable development of the Centres. Thus, the Centres should opt for one of the following scenarios:

- Incorporate Non-profit Organisations / Associations / Foundations with a **varying degree of competence entrusted to the separate legal entity – the autonomous organisational unit** (depending on the Centres' individual situations, goals and needs). This is recommended for the majority of the Centres. Each of these entities shall have their own clear mandate, whether:
 - acting as a **parallel body supporting particular activities** of the partner organisations (described across the report as **less integrated model or above - as “facilitators”**) serving for tasks such as better coordination, representation vis-à-vis third parties, improved industry collaboration, support to joint project application and participation. This model would be suitable for Centres which would benefit from some degree of integration but where the partner organisations prefer to preserve their competences over the research infrastructure and for Centres which have already opted for a federalised structure as the most suitable one (e.g. the National Centre of Excellence in Mechatronics and Clean Technologies with its 17 partners). Where sharing of infrastructure is necessary this can be done through (framework) agreements, OR
 - as a **more integrated model (structure, referred to above as “fully integrated governance structures”)** entrusted with more competences including in the first place the ability to **manage the research infrastructure** as an independent entity, to

set the research agenda, to manage its own scientists and larger number of staff. This structure would be appropriate for some Centres in which the work packages as well as the research infrastructure across the partner organisation and its usage are all fully interlinked and dependent upon each other thus requiring a deeper integration in decision-making (examples include CoC Sustainable Utilisation of Bio-resources and CoC Clean and Circle).

In the case of CoE 'Informatics and Information and Communication Technologies' there does not appear to be an obvious need for creation of a separate legal entity due to the concentration of funding and leadership into one partner, and to their claimed successful previous experience in management of similar projects and.

For a number of Centres, updating the Partnership Agreements may serve as an intermediate step to the creation of separate legal entities. Similarly, the adoption of the less integrated model could at a later stage lead to more integration and more competences being granted to that separate legal and organisational entity.

For three of the Centres related to health and medicine and led by the Medical Universities in Plovdiv and Pleven, as well as the National Centre for Infectious and Parasitic Diseases, respectively, the situation appears to be more particular, in part due to the nature of their activities, and the creation of legal entities should consider this.

The purpose of creating parallel legal entities would be to facilitate operational R&D&I activities foremost among the partners and work for the interests of the Centre (with the caveat that some Centres will be more integrated structures and others less so).

By 2023, the cooperation between the members/partners of Centres is expected to be advanced.

After 2023, the budget for management should be self-sustained. Having a separate entity will facilitate a framework to streamline the effective fulfilment of the five-year obligation period (2024-2028) of operation. Thus, the partner research organisations have up to 70 months overall to (re-) assess what the appropriate form should be to continue their operations, which allows them to work effectively both with each other and with third parties, including industry. Modifying the Grant Agreements before end of 2023 would create undesirable administrative hurdles. The legal entity form should correspond to the needs of each Centre. It should **ensure that the founding partner organisations involved in R&D&I activities at the Centres will preserve their interest** in the development of the Centres while they will **continue to provide their capacity** (scientific, infrastructural and administrative) and dedicate for the sustainability of the Centres, which in turn would guarantee prestige and contacts for the individual research organisations.

The above described options do not exclude the creation of public research institutes (which are organisational structures with external recognition and internal organisational independence) to help universities integrate and consolidate their R&D activities and thus participate more effectively in the Centres.

The possibilities for structuring some of the Centres themselves as public organisations should be further explored, including the example of the GATE project under Horizon 2020. Structures such as public (university) institutes could be relevant for Centres in which one organisation (e.g. a university) participates with several of its faculties requiring the pooling of human, scientific and technical resources by creating an institute entrusted with a degree of organisational independence within the parent organisation.

2. Governance Structure for the Centres

Whatever the legal framework, a streamlined governance and organisational structure is preferred which focuses its efforts on joint value adding RDI actions. Where possible, a **single structure** should be created for the effective management and/or coordination of the Centres' activities. Initially, activities could be grouped around thematic specialisations each with a manager (Component Leader and subject matter expert). The Director of the Centre, a dedicated leader with **both business understanding and scientific knowledge**, would manage the Centre and be accountable for its successful operation. Considering the reduced needs for procurements management and project implementation, the structures **after 2023 should have less layers of management and reporting and be essentially focused on research and innovation.**

Management should be able to both drive a healthy and competitive in-house research programme and to provide support for scientific access and use by external researchers as well as maintain stable collaborations with industry. This double requirement, as well as the proportion of each to be reached, will reflect on the choice of governance structure of each Centre and the qualification and competences of its leadership.

The Centres should have a professional manager with a high degree of autonomy from the partner research organisations, who can be held accountable for actions and results.

It is vital for the Centres (starting from their founding partners) to build a governance structure with **strong governance capacity** at the institutional sustainability level, strong administrative capacity as well as project application and management potential (R&D project management); and to develop common rules for functioning and ensuring **operational sustainability.**

3. Build an understanding of EU State Aid rules and apply them correctly

In order to achieve successful cooperation with industry, the partner research organisations (universities, research institutes at the Academy of Sciences as well as the private partner associations beneficiaries of funds for research infrastructure) need to build essential **knowledge and internal capacity in understanding and correctly applying EU State Aid Rules in R&D&I.** The research organisations managing infrastructure should be able to **differentiate between engaging in “effective collaboration” (which is a non-economic activity) and conducting research on behalf of undertakings (which is an economic activity).** To help with this, the report presents a step-by-step methodology based on the experience of the experts.

The Grant Contracts impose obligations, but even after formal ending of the implementation of the current funding period (2023) the state aid rules and principles will continue to apply. There are rules and requirements on two levels:

- on the level of the research organisation and research infrastructure (e.g. the 20 per cent capacity rule and the ancillary nature of economic activities), and
- in all relations, contracts, collaborations with other entities in particular undertakings (both in the context of economic and non-economic activities).

“Non-economic activity” is a concept with specific requirements and cannot be equated with “non-profit”. **Separate accounting** of economic and non-economic activities is mandatory for all research organisations conducting economic activities, for which an adequate financial administration is necessary. **Analytical costing** is necessary for allocating the costs of **overhead factors** to the respective utilisation by the various activities. Cross-subsidisation of economic activities by public financial means must be avoided.

If the economic activities of the Centre do not exceed 20 per cent of the overall annual capacity and fulfil the conditions for “ancillarity” then State Aid rules do not apply in their entirety as regards the research organisations as recipients of State Aid (however, research organisations can still be a provider of aid to other entities).

If revenues from knowledge transfer (KT) activities are re-invested into non-economic activities, then the KT activity will not count towards the 20 per cent capacity threshold. Thus, it may be fully financed with public financial means. However, this only pertains to the activity on the level of the research organisation, not to the IPR /research results that may be licensed/transferred to undertakings. To avoid passing on State Aid to third parties the research organisation should charge **fees in conformity with market prices or the equivalent of market prices.** Research organisations need to distinguish between **KT/TT as an activity** (impacting capacity usage of the research organisation as a recipient of aid) and the actual **transfer as assets** (impacting relations with third parties and creating possible indirect aid).

4. Build capacity in Technology Transfer and strengthen collaboration with industry. Technology Transfer (TT) and industrial collaboration strategies should be developed according to actual demand needs and future opportunities including contract research, joint laboratories, Proof of Concept (PoC) funds, licensing and spin-off creation.

There is a clear need for TT capacity building in the country. This activity should include continuous education of the technology transfer offices (TTO) staff across all Centres. **The appointment of a TT manager** within each Centre will allow more efficient coordination of TT activities between the Centre and partner institutions’ TTOs. Centre management should **create a favourable internal framework and streamline the process of spin-off creation** that will encourage scientists and researchers to engage in entrepreneurial activities in parallel with their research work, including networking opportunities and mentoring programmes. **Investor readiness programmes in Bulgaria must also be improved and adjusted** to the needs of the research and deep-tech oriented funds, as well as to the particular characteristics of researchers.

Academia-industry collaboration could be formalised to discontinue some non-transparent practices, which can be self-interested and do not bring the added-value potential to the economy and society. Research organisations should build experience in negotiating and structuring more complex and longer-term joint activities with industry including of the type “effective collaboration”.

5. Strive for sustainability

The Centres should utilise their **full potential for increased sustainability** achieved through:

- Increased economic and non-economic collaborations with industry in the short-, mid- and long term;
- Research commercialisation through licensing and spin-off creation in the mid-to-long term
- Increased participation in international projects (e.g. Horizon Europe).

The Centres should take a more proactive role in organising their sustainability, especially after 2023, by not relying exclusively on (guaranteed) block public funding and support.

Since most Centres have prepared their scientific programmes and plans for collaboration with industry in 2016-2018, these should be substantially updated, taking into account that a large part of the infrastructure has been procured and the Centres are becoming increasingly operational. While

in some Centres the plans for collaborations are based on careful and detailed track record and analysis, others only have plans at conceptual stage and will need to conduct a deeper and/or more specific market consultation. The Centres would also benefit from developing more comprehensive business plans that capture the vision and strategy for their long-term sustainability.