Fragmentation of the Public Science Base in Central and Eastern European Countries

By Maria Nedeva, Manchester Institute of Innovation Research (MIoIR), the University of Manchester

Maintaining a vibrant and robust science base, and higher education (HE) system, has long been recognised by science policy experts to be major preconditions for success in the knowledge economy and society. Effective and efficient research and higher education systems are characterised by optimal research funding from public and private sources, coordinated variety of research performing organisations, close links between types of research, bridges between research and education, and appropriate governance and evaluation regimes.

In this context, the fragmentation of the public science base along organisational and functional lines, along with sub-optimal funding and deficient governance and evaluation regimes, is perceived to damage materially the effectiveness and efficiency of research and education. Organisational and functional fragmentation, as the reviews conducted under the Horizon 2020 Policy Support Facility (PSF) found, is an underlying problem of the science and education systems in Poland, Bulgaria, Armenia and Georgia.

Issues associated with the fragmentation of the science base are not exclusive to the research and education systems in the Central and Eastern European countries. Other European countries, including Belgium/Flanders, France, Finland and Denmark, recently tackled issues of organisational and functional fragmentation by consolidating their respective national research systems and merging, or bridging, research institutes and universities. In Central and Eastern European countries, however, these issues are rooted in historical trajectories and demand urgent, and decisive, policy attention because of their importance for bringing the public science base to a level where the country can usefully participate in the international organisation of science and research.

Fragmentation of the public science base in Poland, Bulgaria, Armenia and Georgia

If there is one thing about the science base we can state with any certainty, it would be that it is highly complex. Within this complexity, the public science base can be fragmented along different, intersecting lines. Empirically, research fragmentation usually manifests as: a) separation of the organisational sites where research is conducted, or 'organisational fragmentation'; b) split across fundamental and applied research, 'blue-sky' and 'mission oriented' research, and research and education, or 'functional fragmentation'; and c) dispersion of research equipment, facilities for research and research networks, or 'research capacity fragmentation.

These lines of fragmentation of the public science base often, but not necessarily, overlap. In other words, there may be functional research fragmentation, or capacity fragmentation, even when different types of research and research and teaching are within the same organisations. This is important to keep in mind since, as we shall see, different kinds of fragmentation respond to very different policy interventions.

Without exception, the PSF reviews of the public science base in the four countries in question recognised the organisational, functional and capacity fragmentation of their research systems as the cornerstone problem needing urgent policy intervention. For instance, the PSF review of the Bulgarian research system places an explicit emphasis on the urgent necessity to overcome the separation between research and teaching and to remedy the organisational fragmentation of the country's higher education. With a similar sense of urgency, the PSF expert panel reviewing the Georgian research system advised on overcoming the functional and research capacity fragmentation in the country's research base. Tackling, and resolving, these problems were recognised by the four PSF reviews to be a key (pre)condition for reforming the national research systems in Poland, Bulgaria, Armenia and Georgia and improving their performance dramatically.

Hence, the PSF review of HE and research in Poland recommended as a priority an organisational reform aiming to reduce the level of fragmentation in the science base. The organisational fragmentation between higher education and research in Poland is evident in the relatively large number of non-differentiated universities and the organisational arrangement whereby a significant proportion of research is conducted in 114 public research institutes employing over 12,000 researchers and the 70 institutes of the Polish Academy of Sciences employing some 8,000 researchers. Research, albeit on a smaller scale, is also performed by the universities. The **report suggests that consolidating the research capacity in the top universities and the best performing research institutes could increase the visibility of science in Poland considerably** and improve the standing of Polish universities in international rankings.

High level of research fragmentation was also evident during the PSF review of the HE arrangements in Bulgaria. This review clearly stated that the Bulgarian research, innovation and education system is characterised by a very high level of organisational fragmentation that manifests in the very large number of, largely weak, universities and in conducting research predominantly in the institutes of the Bulgarian Academy of Science and the Agricultural Academy. This **fragmentation, the report goes on to argue, is the most 'fundamental failure' of the Bulgarian R&I system** that leads to, among other issues, the dispersion and waste of the already marginal funding for research. Furthermore, in Bulgaria, this organisational fragmentation is profoundly embedded in the cultural and political context and overcoming these powerful interests necessitates active, and decisive, policy intervention.

Similar in form and level, organisational fragmentation of the research performers was also evident in Armenia. Research is performed in the 35 research institutes of the Armenian Academy of Sciences, the 47 institutes under the remit of the State, including those at universities, and other higher education institutions. It is worth noting that, according to the PSF report, in 2019, some 69 research units received organisational, baseline funding and the overwhelming majority are under the Armenian Academy of Sciences. Like in other Central and Eastern European countries, in Armenia, the expert panel found a profound separation between research conducted in different research organisations, as well as a split between teaching and research.

Somewhat different issues of fragmentation of the public science base were observed in Georgia. Georgian authorities had already incorporated formally the institutes of the Georgian Academy of Sciences within the universities, approximately a decade before the PSF review. Curiously, this didn't result in functional and capacity integration between research and higher education, and between different type and fields of research; there were still acute problems of fragmentation of the science base. The PSF review found that research and researchers, at the universities were treated as an under-class in terms of funding, salaries, working conditions and access to teaching opportunities. Apart from that, there were many sub-critical research units and scientific laboratories, with insufficient, and obsolete, research equipment and facilities and no mechanisms for coordination and cooperation.

Responsive to the problems that the fragmentation of the science base entails, the expert panels conducting the PSF reviews in those countries recommended a host of policy measure aiming to remedy the situation and aid the (re)building of their healthy and vibrant research and innovation systems.

Policy measures to overcome the fragmentation of the science base in Central and Eastern European countries

Overcoming the fragmentation of the science base in these countries necessitates urgent and targeted policy attention. Hence, a range of policy measures to increase the level of organisational, functional and capacity integration of the science, innovation and education systems in Poland, Bulgaria, Armenia and Georgia have been suggested. There was a strong emphasis on intentional and direct policy action in this respect.

Most policy measures advocated by the PSF expert panels fall under six broad categories. These are:

- **Mergers of higher education organisations** (e.g. universities and equivalent), voluntary and incentivised, to reduce their number and integrate research and teaching capacity. Furthermore, the reviews recommended the introduction of 'ruthless' and robust selectivity to increase the quality of teaching and research.
- **Integration of universities, Academy and sectoral research institutes**. Policy measures aiming to achieve a level of integration between universities and research institutes were proposed for the systems where most research is still conducted within the Academy and sectoral research institutes, e.g. Poland, Bulgaria and Armenia. At one extreme, it was suggested that all research institutes are legally transferred to universities. Yet, legal and organisational integration doesn't necessarily lead to functional and capacity integration, as the Georgian case

evidences, although this is a helpful initial step. Changes in career demands, equalising working conditions, and expectations are also necessary.

- **Integration of large equipment and facilities.** In some cases, the PSF expert panel recommended creating trans-organisational entities, e.g. transgressing universities and research institutes, to host, maintain and share large, expensive equipment and facilities. This measure, it is hoped, may solve the problems around the fragmentation of research equipment and facilities.
- **Enabling shared responsibilities for teaching, research and doctoral training.** Policy interventions encouraging shared responsibilities around teaching and doctoral training, are necessary for overcoming the fragmentation of the science base irrespective of whether research institutes are merged with universities, or not.
- **Emphasis on collaborative research schemes**. There has been much ado in science policy about the benefits of healthy competition for resources. While competition is helpful, we shouldn't under-estimate the advantages afforded by cooperation and collaboration in research. Where the science base has been fragmented, conducting collaborative research across organisational, and research field, boundaries can build powerful integrative bridges.
- **Programmes for national level, research specific, event.** Such policy supported events organised by leaders in the respective research fields could have strong integrative effects across organisations and types of research.

While in several cases some of the PSF expert panels' ideas about policy measures to remedy the fragmentation of the science base in these countries were already taken up by national governments, solving these problems will take time, commitment and ingenuity.

Seeking to improve the design, implementation and evaluation of research and innovation policies, the PSF provides expertise and practical support to Member States in a number of ways: Peer Reviews of national R&I systems, Specific Support to policy reforms, and project-based Mutual Learning Exercises to improve policymaking and implementation. It is founded under Horizon 2020 the EU's research and innovation programme with up to €20 million.