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TECHNOLOGY ASSESSMENT IN CENTRAL AND EASTERN EUROPE

STATUS QUO IN 2022 AND FUTURE PROSPECTS

ITA – INSTITUTE OF TECHNOLOGY ASSESSMENT

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STATUS QUO IN 2022 AND FUTURE PROSPECTS

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KEYWORDS

Technology Assessment (TA), Central and Eastern Europe (CEE), Responsible Research and Innovation (RRI), TA futures, citizen engagement, transition economies, TA infrastructures

ABSTRACT

This paper presents an overview of activities and organisations carrying out Technology Assessment and related disciplinary fields, in Central and Eastern European countries. The overview is guided by questions on research, civic participation, and policy advising addressing societal, economic, and environmental aspects of technological change in the region. The main contribution of this paper is an update on developments in the institutionalisation of TA and TA-related activities in the last two decades. It builds on previous topical work by Banse (1998a; 1999b) and is furthered by collaborations in EU projects throughout Europe and the institutionalisation of TA networks (such as the European Parliamentary Technology Assessment (EPTA) network and the globalTA network). The paper first provides a historical and political frame of the region. In a second step, we describe the critical approaches to technological innovation and the organisations analysing them. The barriers and supports to institutionalisation of TA and related activities in the region are described and suggestions for a way forward are made. Although the presentations, discussions, and feedback rounds with invited experts, as well as the literature review on which this paper is based, cannot replace a systematic analysis of all the research, participatory and advisory activities related to TA in the region, they present a step forward in the planning and pursuit of strengthening TA in these countries. From a scientific perspective, the paper provides reflections on bridging political, cultural, and economic country contexts with infrastructures for TA.

This paper is the synthesis of the rich contributions to an online conference on March 21st, 2022, organised by the Institute of Technology Assessment (ITA) of the Austrian Academy of Sciences, co-hosted by the globalTA network. The participants of the conference contributed with reports on the status quo and perspectives of technology assessment and related fields in their respective countries.

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INTRODUCTION

Not too long after the fall of the Iron Curtain in 1989, Western interest arose in scientific exchange with researchers and research institutes in Central and Eastern European countries. In particular, German-speaking technology assessment (TA) scholars, such as Gotthart Bechmann from the Karlsruhe Institute of Technology, Institute for Technology Assessment and Systems Analysis (ITAS-KIT) and Ernst Braun, the founding director of the Austrian Academy of Science's Institute of Technology Assessment (ITA), began research on identifying which kinds of similar activities were going on in eastern European countries. At the beginning of the Nineties, a workshop bringing together more than twenty TA scholars from Western European countries and interested academics from Eastern Europe took place in Prague, organised by the Institute for Theory and History of Science of the Czechoslovak Academy of Sciences (ITHS-CAS 1992). The different cultural backgrounds and their impact on the possible development of TA in this part of Europe were a core workshop topic. For example, the prominent Polish scholar Lech W. Zacher discussed the conditions and barriers to institutionalising TA. A comparative project on TA in Eastern Europe was carried out from 1997–1999 by the European Academy in Bad Neuenahr (Banse 1998b; Banse 1998a). Albeit all these activities, at the turn of the Millennium, Banse still came to the conclusion that this part of Europe was "terra incognita" for Western TA practitioners (Banse 2000). This author – writing in German in a Czech journal – stated that the conditions for TA (in a broad sense) had improved after the end of the socialist regimes and had become worse at the same time: on the one hand, improvements had been realized as TA had become more accepted as a means of policy advice and received more support; on the other hand, the situation had worsened as the economic, financial, and labour market conditions had deteriorated (2000, p. 139). However, Banse reported a few examples of early TA activities in the 1990s, such as the two TEMPUS projects in Hungary, "Teaching Social Assessment of Science and Technology" (1991-94) and "Improving Teaching Social Studies of Technology" (1995-98), and a few conferences and workshops (Banse 2000, p. 141). Moreover, the Prague Institute of Advanced Studies (PIAS) had been founded in 1991[1] (cf. Pechan 1996; Skoda 1991). Banse referred to various attempts to institutionalising TA or TA-like activities, e.g., in Hungary, and asserted a focus on environmental issues in many Eastern European countries. Banse concluded that CEE nations did not intend to merely import TA concepts from Western Europe but to develop approaches to fit their own specific contexts (p. 142) – a topic that will come up again in our analysis below and is identical to the adoption of practices of the US Office of Technology Assessment (OTA) in other European countries. Banse also observed that the activities have not been carried out in concerted action but as separate initiatives (p. 143).

Today, 25 years later, the understanding of TA and TA-like activities in Central and Eastern Europe (CEE)[2] is still in its infancy. The Monitoring Activities of Science in Society in Europe (MASIS) report included all CEE countries that are also members of the EU. The report generally focused on how European societies interacted with and shaped science (MASIS expert group 2009). By contrast, the comparisons and analyses of TA organisations of the last two decades mostly focus on Western Europe (EPTA 2013; Nentwich 2016; van Est et al. 2015; Enzing et al. 2012) or have a global perspective (Hahn/Ladikas 2019; Hahn et al. 2023 forthcoming). A lighthouse activity in this respect has been the "Parliaments and Civil Society in Technology Assessment" (PACITA) project (2011-15), a pan-European endeavour to promote TA thinking across the different regions of Europe.[3] This initiative (Hennen et al. 2013) included Hungary (Fried et al. 2013), the Czech Republic (Pokorný et al. 2013), Lithuania (Leichteris/Stumbrytė 2013), and Bulgaria (Kozarev 2013).

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1 PIAS has been dissolved in 2013, see: *rejstrik.penize.cz/40764729-the-prague-institute-of-advanced-studies-pias-v-likvidaci*. Note: This and all subsequent URLs last checked on 20/10/2022.

2 We use the EuroVoc definition and focus on EU member states, see *op.europa.eu/en/web/eu-vocabularies/concept/-/resource?uri=http://eurovoc.europa.eu/5781&lang=en*.

3 *pacitaproject.eu*.

Although not comprehensive regarding the whole CEE region, the results were telling: echoing Banse, Hennen and Nierling (2014) coined the notion of a "TA habitat in the making". The challenges to improving national capabilities for an inclusive approach to technological innovation are, among others, the need for coordination in building up and restructuring R&D systems, developing democratic procedures, involving the public, increasing transparency in decision-making, improving trust in institutions and improving long-term strategic thinking (ibid., p. 56) in specific TA directions.

The overall picture has changed slightly in the last couple of years. On the one hand, TA-related initiatives in Hungary quickly lost momentum for lack of support after the end of the EU PACITA project, and the Lithuanian partner, Knowledge Economy Forum (KEF), focussed on other issues. On the other hand, the partners in Bulgaria (the Applied Research and Communications ARC Fund) and Czechia (Technology Centre TC PRAGUE of the Czech Academy of Sciences CAS, formerly TC-AS) remained highly active, participating in various EU projects since 2016. The 4th European TA Conference in 2019, hosted by the Slovak Academy of Sciences (SAS) took place in Bratislava, bringing the community together and building on the collaborations in previous EU projects. More recently, in 2021, Lithuania became an associate member of the European Parliamentary Technology Assessment (EPTA) network with its newly founded parliamentary Committee for the Future.[4]

The globalTA network, founded in 2019, currently lists four member-institutions located in CEE countries: the ARC Fund (Bulgaria), TC PRAGUE (Czechia), the KEF (Lithuania), and the Slovak Academy of Sciences.[5] Also, TA activities became more visible in Poland, e.g., via the Polish Association for Technology Assessment (PTOT)[6] and the Łukasiewicz Center for Technology Assessment[7]. TA or TA-like initiatives in other countries remain less visible.[8]

Therefore, in 2021 and 2022, the Institute of Technology Assessment (ITA) of the Austrian Academy of Sciences deemed it timely to take a new initiative to bring together representatives of all CEE countries that belong to the European Union (see Figure 1 below), intending to get a fresh overview on the TA landscape in the region. The country reports on which this paper is based were presented at an online workshop on March 21st, 2022. This provisional mapping is the background for the current paper, which attempts to synthesise the information on the status quo of policy-oriented technology assessment or related fields in the CEE. Our paper is thus more comprehensive than earlier attempts, particularly PACITA, as to geographic scope (covering eleven countries). However, we did not carry out in-depth case studies or interviews but relied mainly on the rich information brought to our workshop and on the feedback from our regional contributors. Therefore, we consider this paper as a starting point for further research – particularly as an inspiration for networking, mutual learning, and future collaboration on developing the field and its national infrastructures.

4 *eptanetwork.org/members/associate-members/lithuania*.
5 *globalta.technology-assessment.info/members*.
6 *ptot.pl*.
7 *orgmasz.pl/en/*.
8 For an up-to-date account of the TA landscape in Poland, Czechia, and Slovakia, see Soler et al. (2022 forthcoming).

Figure 1: The countries of Central and Eastern Europe (CEE) included in this analysis
Source: ITA

QUESTIONS GUIDING THE REPORTING

Before we delve into the descriptions of the CEE region and the organisations and activities identified in approaching technological change through TA perspectives, we owe our readers the definition of TA used in this paper and the research questions guiding the reporting. TA, for the purpose at hand, is defined as a collection of different approaches and methods allowing for an interdisciplinary evaluation of technological progress with specific regard to the social, ethical, environmental, health, and economic consequences. A central aim is to investigate discrepancies between societal norms and values (informally or formally upheld by opinions, rules, laws, regulations, and standards), and the fast-paced pushing forward of technological innovation. TA scientists, practitioners, and policy advisers research these discrepancies, identify ways to overcome them and communicate their insights.

In order to capture the diversity of organisations and activities carrying out TA (explicitly or implicitly), this work was guided by the following research questions for the respective countries in the CEE region:

- What are the main (emerging) technologies being addressed regarding their risks to society, the environment, and the economy?
- Which disciplines are shaping the discourse on these issues?
- What are the main challenges in addressing these issues, both academically and politically?
- What could be done to strengthen the political discourse on the unintended socio-economic consequences of technological innovation?

While these guiding questions represent central themes in the TA discourse (cf. the PACITA project mentioned above), the evidence on which our contribution is based also has relevant limitations. The evidence presented is based on a literature review and first-hand responses to the questions by experts from academia in the CEE region. Thus, these overviews are based on individual expert judgement and feedback, and no further empirical research has been done for this paper.

Following this introduction, the paper comprises four further sections: Section 1 describes the cultural, economic, and political contexts of the region. Section 2 places the focus on TA issues and the organisations involved in carrying out TA and TA-like activities in the CEE countries examined. Section 3 presents the way forward for TA in CEE and describes the main challenges and drivers of TA expansion. Finally, section 4 provides a concluding summary.

1 CULTURAL, ECONOMIC, AND POLITICAL CONTEXT

1.1 REGIONAL BACKGROUND AND INNOVATION FEATURES

The social, political, and economic development in the CEE region has not been a straightforward evolution, and there has been considerable diversity across countries. Different phases of transitions and convergence (see Gligorov et al. 2019) have since shaped countries in anything but a homogenous way. Some countries have had more significant difficulties than others in 'catching- up'. In a recent overview, Gligorov et al. (2019) describe three phases of economic development common to the CEE region.[2] During the first phase, economic output fell sharply after 1989; only Poland "regained its pre-1989 GDP in the first decade (by 1996)", while Czechia did so in 2000, Hungary in 2001, and Romania in 2004 (ibid. 2019, p.4). The second phase is characterized by explosive economic growth from around 2000 until the financial crisis. For example, Hungary's GDP grew by 31%, while Romania's by 67%. In the third phase (from 2009 to the present), growth continued, along with income convergence, albeit to levels lower than the previous boom period. Politically, after an initial period of institutional convergence, an essential part of the CEE region experienced a stream of right-wing populist movements emerging and raising questions about the region's commitment to values of deliberative democracy and the rule of law (Stanley 2017).

More than thirty years after the collapse of state socialism in CEE, the "visible traces of the events of 1989 and the preceding era of state socialist collectivism remain very apparent in the geographies of 'post-socialism'" (Smith/Timár 2010). However, just like the events of 1968[9] (Tismaneanu 2010), the effective collapse of the state-centrist, collectivist, and planned model of development across a large part of the world not only led to a profound, highly uneven, and contested set of transformations, but has also meant that, in the words of Stenning (2010), 'we are all post-socialist now'.[10] The collapse of the collectivist and central planning systems, for example, has been one of the many forces that have been used for legitimizing the ascendancy of neoliberal capitalist relations around the world (not just in the 'post-socialist' world) – notwithstanding the dramatic global economic crisis that this particular model of development led to in 2008/9 (Smith/Timár 2010).

Internal commonalities and divergencies characterize the CEE region. In terms of developing policy and institutional frameworks, political participation is central. While initially very high after 1989 throughout the region, after two decades of transition, "political participation levels in Central and Eastern Europe remain significantly lower than in Western European countries." (Hooghe/Quintelier 2014, p. 209). Many researchers explain this lower overall participation as caused by the socialization of citizens under authoritarian regimes (e.g., Letki/Evans 2005; Horvat/Evans 2011). Others argue that corruption, lack of good governance, and low levels of economic development continue to discourage political participation (this is called the experience perspective) (Evans/Whitefield 1995; Jahn/Kuitto 2011; Hooghe/Quintelier 2014). Today we can also witness

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[9] In the context of the Cold War, 1968 marked a transnational moment of mass social movements beyond the East-West divide (see e.g., Agosti et al. 2004). From widespread protests in Czechoslovakia (the Prague Spring), Poland, Yugoslavia to mass student protests in Western Europe (e.g., May 1968 in France or Sessantotto in Italy), 1968 redefined oppositional politics, political participation, and civil movements.

[10] Although one may consider the two upheavals on opposite ideological representations – some see 1968 as anti-capitalist and 1989 as pro-capitalist – others see them as a continuation, especially in the context of the CEE region and rejection of "old left" (see Arrighi et al. 1992).

growing variation between the CEE countries with regard to politics and economics. These common features, particularities, and polarisations are significant when describing the overall context within the CEE region.

However, social and technological development challenges within the post-socialist region cannot be understood solely through the lens of (transition) economics. The post-socialist transformation is an open-ended process involving different parts where institutions are the underlying determinant of how the innovation landscape evolves (Radosevic 2022).

1.2 INNOVATION, R&D, AND EUROPEANIZATION

Across the CEE region the RDI landscape is institutionally corelated with EU integration processes (through cohesion funding as well as institutional convergence). Beyond starting from different conditions (pre-1989), and general converging tendencies, the transition period also led to significant differences within the CEE region (non-homogenous regional dynamics). For instance, with regard to R&D system, the Baltic States (Estonia, Latvia, Lithuania) have stood out in the CEE context by virtue of their radical approach taken to their reform after 1989 (Kristapsons et al. 2003). Even more significantly, after EU accession, differences remained within what some authors call a differentiated integration framework (see Schimmelfennig 2016; Schimmelfennig/Winzen 2019). Differentiated integration describes a system whereby a core set of EU members set standards for good governance. Some countries will opt out of specific EU legislation or treaties. Other countries that "fall short of this standard are refused further integration by the core: their membership grade increases with better governance" (Schimmelfennig 2016, p. 1). For example, Ireland opted out of the Schengen Agreement, while Bulgaria and Romania were both so far rejected by the Council due to corruption concerns.

While a system of non-homogenous, flexible integration provides a way to further EU integration in ways that overcome disagreements between member states, it can also be problematic. Firstly, debates on differentiated integration led to a divide between scholars in Western Europe and scholars in Eastern Europe, with the former having positive views and the latter opposing views on the concept of differentiated integration (Kröger/Loughran 2022). Secondly, some support a flexible Europe as a driver for the efficient functioning of the EU in the context of a diverse EU membership. Nevertheless, risks have also been associated with a potential East/West divide and concerns about domination, equality of rights, and fairness (ibid.).

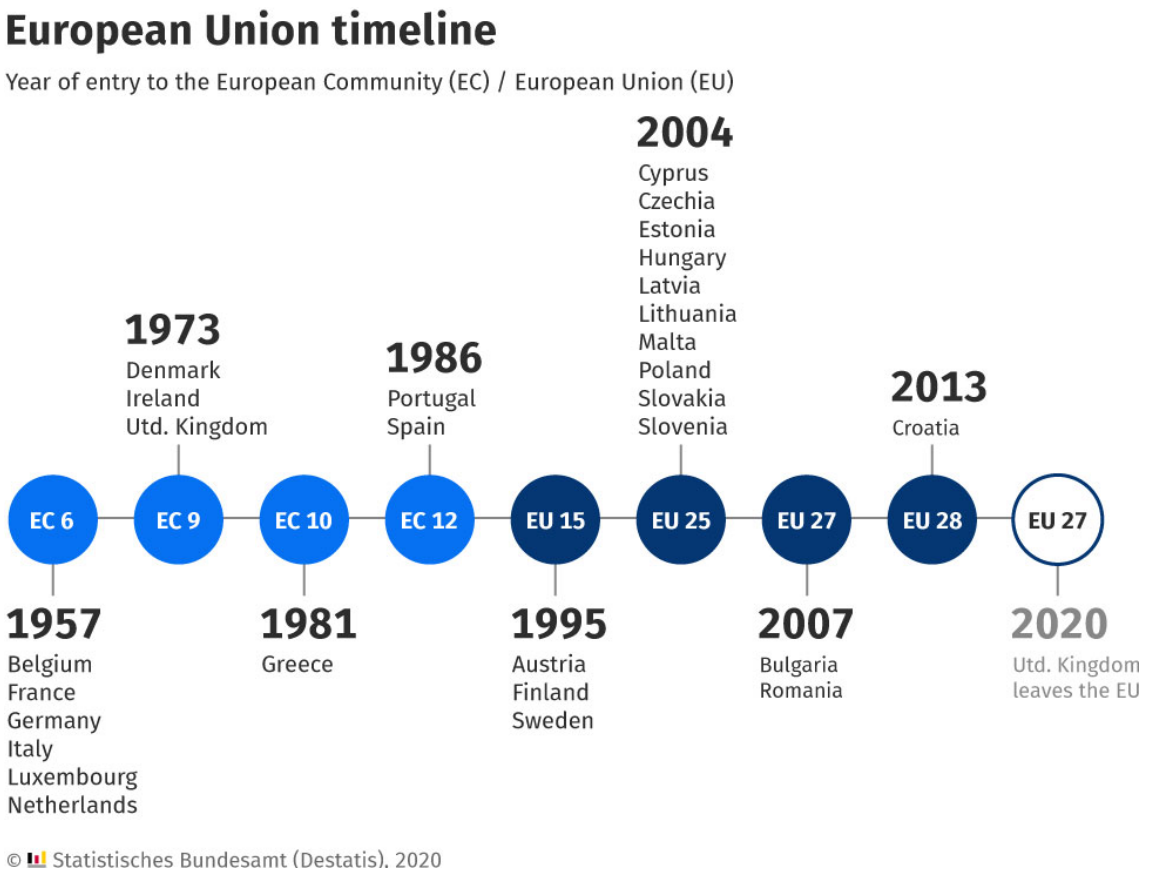

Figure 2: EU Integration Timeline
Source: *destatis.de/Europa/EN/Country/EU-Member-States/_EU_EZ_Zeitverlauf_en.html*

Therefore, the expansion of the EU to include the post-socialist CEE countries has faced the challenge of integrating regions with different economic development levels. This problem persists to this day through regional polarization and peripheralization processes resulting partly from integrating all areas in the EU into the single economic market (Lang/Görmar 2019).

However, convergence and a 'one-size-fits-all' approach would also not be optimal, considering accommodating economic, social, and cultural heterogeneity across the EU and CEE, in particular. As Belamy and Kroger (2017) have argued, the extent that "member states have unequal stakes [and capacities] in EU level collective decisions, reflecting their economic and social heterogeneity" plays a role in EU integration (p. 623).

As innovation became a more established part of EU cohesion policy, a debate has arisen about the compatibility of these two policy areas for less developed target regions. The argument is that the highly developed cores would not benefit the most from a regional policy based on innovation capacities. If this is correct, it would have implications for CEE countries, which are experiencing solid patterns of regional polarisation (Kühn 2015; Lang et al. 2015). Despite progress towards economic convergence between CEE countries since accession, other events, such as the financial crisis, have furthered regional polarisation across Europe, calling into question the effectiveness of these supranational European policies in less favoured regions (Lang/Görmar 2019; European Commission 2017; Hadjimichalis 2011; Hadjimichalis/Hudson 2014). At the same time, Europeanization of national S&T and innovation policies has also shown some trends of convergence with the pan-European trends, though with some lagging in terms of promoting participatory processes in the assessment and evaluation of the impacts of technological development (Ādamsone-Fiskoviča 2005).

1.3 POLITICAL CONTEXT AND CHALLENGES FOR TA

There are several challenges when attempting to describe the TA-related environment in CEE. In many of the countries reported on, the landscape is characterized by political unpredictability (as well as policy volatility) and relatively low budgetary allocation. The importance of R&D on the political agenda is low, as shown by the gross domestic expenditure on research and development (GERD), otherwise called R&D Intensity. As Figure 3 shows, based on data from the EU's statistical office (Eurostat 2021), all CEE countries fall below the EU average (in some cases, more than four times lower).

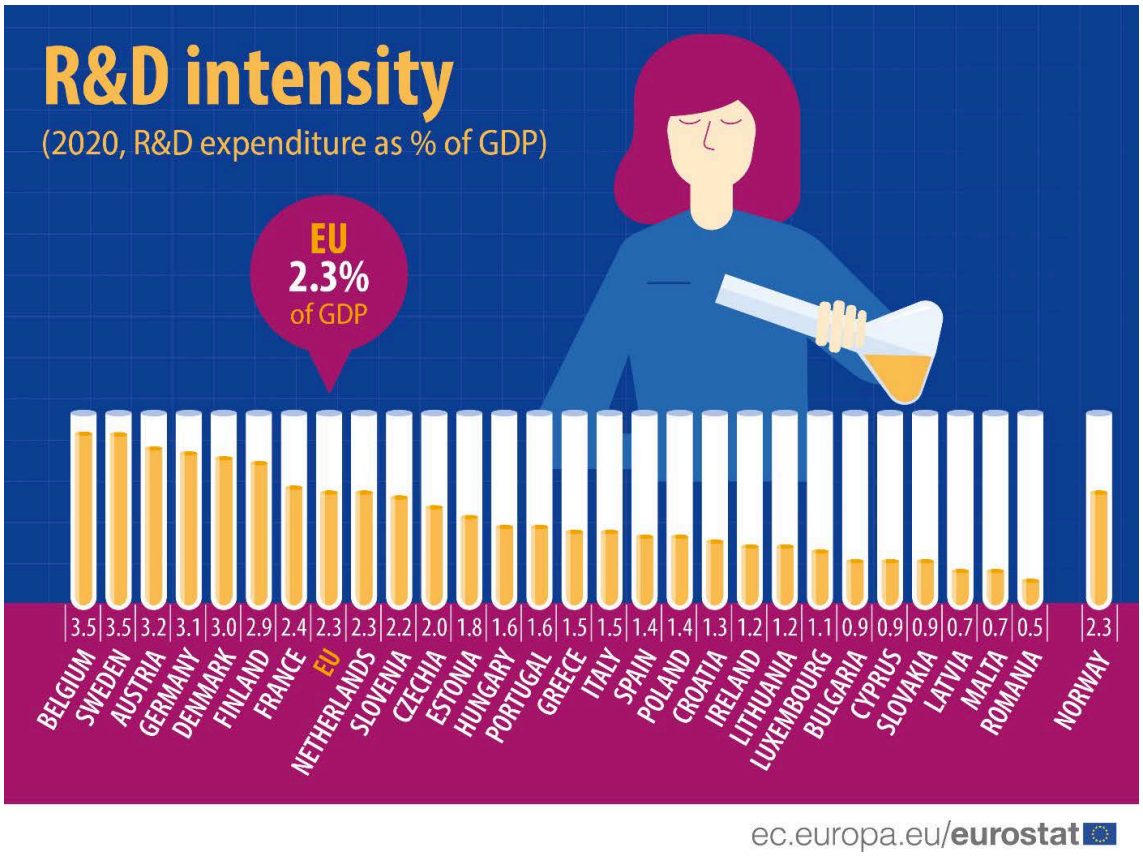

Figure 3: Percentage of GDP allocated to research and development (2020)
Source: *ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20211129-2*

While during the 2014-2020 policy cycle, various R&D-supporting strategies were designed and implemented, issues remain regarding the level of coordination and integration. R&D investment governance remains fragmented amongst government branches and agencies.

Throughout the region and within the individual countries, expansive networks of universities and R&D institutes are established, as well as broad academic expertise. However, what almost all participants of the online conference reported as challenging is the level of fragmentation relating to the R&D landscape. Public institutions proactively push for positive changes, as exemplified by the *Executive Agency for Funding the Higher Education, Research, Development and Innovation* (UEFSCDI) and the *Agency for Development* in Romania. Therefore, we find significant examples of state agencies creating momentum for increased stakeholder involvement in R&D policies, open data sharing, and investment more broadly.

A telling example of both fragmentation and low prioritization of R&D investment policies is Hungary. In this case, institutional instabilities and government STI policy impact the development of long-term strategy and planning (see Section 1.5 below). The relevant institutional landscape further offers a clear picture in this sense. The Hungarian *National Research, Innovation, and Science Policy Council*, established in 2011, operated for just 2.5 years. The subsequent *National Body for Science Policy and Innovation*, founded in 2013, showed minimal activity. The Hungarian *National Science Policy Council* was established in February 2020 and, while slightly more active relative to its predecessors, is still, as reported by the participants, not significant within the Hungarian R&D landscape.

In Poland, the *Łukasiewicz Research Network* (LRN), comprising 28 research institutes, primarily focuses on mobilising scientific research for business solutions. In the last few years, the LRN tried to develop a *Centre for Technology Assessment*, whose aim is to function as a consulting, and not a TA research institution. Working with public institutions, companies, and non-governmental organizations, the Centre aimed to provide expert knowledge about the effects of introducing new technologies.

Fragmentation means, in turn, a division of responsibilities and activities, adding a layer of complexity and lack of clarity and accountability. Among the significant consequences of the R&D investment status quo is the vulnerability to political and ad-hoc changes and stakeholders' pressure to align the R&D priorities to specific group interests. Both public and private sectors in many cases "function in silos, responding to distinct pressures" (Chioncel 2020).

In terms of the R&D landscape, civic (public) participation is an important topic, with significant differences between CEE countries. Most country studies reported comparatively little effort in involving the public in the process of priority setting and assessment activities regarding science and technology, as well as few citizen-initiated activities that have strongly impacted decisions related to science and technology (Ādamsone-Fiskoviča 2012). Compounded by unclear communication of aims when it comes to TA, many participants reported an absence of civil society advocacy or civic participation on TA issues (e.g., Slovenia).

Hungary is perhaps the country where the political challenges were seen as the most substantial. The participants reported no meaningful STI policy discussions for collaborative thinking among researchers, practitioners, policy analysts, and policy-makers. Significantly, they reported intense pressure as issues "must be subordinated to political and ideological perspectives". For example, the participants reported that, tellingly, even the word 'policy' has been deleted from the government's vocabulary. Generally, as one participant stated, the political environment can be pretty tricky as critical remarks by independent analysts are considered political attacks.

NGOs are an essential part of the political landscape of civic participation in environmental causes, with significant regional growth since the early 1990s. In Croatia, for example, after independence, the number of NGOs increased steadily from around 200 in 1999 to 2363 in 2022. While, as reported in several cases (e.g., Latvia, Romania) environmental NGO activity is growing, civil society participation on other TA issues is still relatively low. There are also outliers in terms of innovation and public perceptions. In particular, Estonia's digitally advanced economy clearly showed a pro-digitalization outlook after independence. It was one of the first countries to fully implement e-voting, e-banking, and continuous implementation of digital services as part of government strategy. Public acceptance for digital services is high in international comparison. The NGO sector also shows significant activity, such as the *Institutul de Prospectiva* in the Romanian case. This NGO consults private and government actors by implementing foresight exercises and designing foresight tools for policy formulation. Moreover, *Institutul de Prospectiva* acts as a bridge between the Romanian government, academic structures, and EU institutions through (foresight) projects, thus providing alternative ways for existing expertise in the country to conduct TA-specific activities. While tentative, this development in TA activities by NGOs shows significant regional potential to expand and grow. At the same time, it is unclear to what extent the NGO and even the private sector can fulfil the needed RDI policy coordination, which is missing from governmental actors.

1.4 PARLIAMENTARY TA AND THE PRESENCE OF TA-RELATED GOVERNMENT AGENCIES

The EU-funded PACITA project focused on the network of parliamentary TA institutions and institutionalised practices across Europe. Lithuania, Bulgaria, Czechia, and Hungary were directly involved in this project. It documented long-standing parliamentary offices for TA throughout Europe, where TA is an integral method of advising parliaments in decision-making (Barland et al. 2015). Cross-European cooperation in general, was and still is only in development, whereas the focus remains national or regional. The PACITA collaboration showed that parliamentary TA is inadequate for addressing social concerns regarding technological change in the countries studied in the PACITA project (in particular because of the role of parliaments in these countries vis-à-vis the governments), which can also be reasonably assumed for the entire CEE region.

In 2022, many CEE countries report increasing TA-related activity at the parliamentary institutional level. In the Baltic states, the *Foresight Centre* at the Estonian parliament has been a vital policy advisory body for long-term developments since 2016. In December 2020, the Lithuanian Parliament established a *Committee for the Future*, drawing on the example of the long-standing Finish Committee for the Future. However, in the neighbouring country Latvia, there are currently no dedicated parliamentary or ministerial TA units in – similar to all other CEE countries. However, the EPTA network is a significant driving force in this sense, as we will discuss below.

As in all countries, Health Technology Assessment (HTA) is more formally institutionalised than TA in CEE. HTA is a highly specialised form of TA which evaluates medical and healthcare products and services and has its own scientific community, approaches and methods. In Latvia, for example, HTA is formally carried out in the in the *Commission of Medical Technology Assessment* (HTA). The same HTA activity levels were also reported in Czechia. Slovakia has also yet to establish a solid TA organisation formally recognized by the national Government or parliament. Also, while strong formal TA organisation are missing in Hungary, HTA is dominant in terms of (stable) institutional landscape. Intensive HTA development is also due to EU health and medical regulation, which is more focused on HTA-related aspects than TA. Bulgaria, for example, as part of the EU legislative area, includes a designated HTA body founded in 2015, part of the *National Centre for Public Health and Analyses* (NCPHA). In Romania, HTA is represented by *The National Agency for Medicines and Medical Devices*.

1.5 GOVERNMENTAL STRATEGY: LONG-TERM VS. AD-HOC (AND OTHER COORDINATION ISSUES)

Several participants reported instability, inconsistency, and unpredictability as significant barriers to policy-related TA activities specifically, and R&D more broadly. In terms of institutional coordination and policy, one of the most significant findings from our project relates to how government RDI strategy is adopted. Many participants reported, as a central (structural) challenge, the extent of long-term strategic thinking regarding RDI policy. For instance, strategy-setting methods (such as foresight, the impact analysis of previous strategies, and the evaluation of former policies) are not systematically applied in CEE countries when devising STI policy documents. Nor are participatory methods used to engage stakeholders to underpin strategies, according to many of the expert inputs received.

In Lithuania, for example, in the short term, many institutional changes happened in recent years. New and "refurbished" bodies were active, increasing inter-institutional competition. The Lithuania 2050 (LT2050)[11]

[11] *lrv.lt/en/news/roadmap-for-the-state-progress-strategy-lithuania-2050*.

government strategy process included plans for inter-institutional cooperation; however, so far, as one participant reported, there is a considerable lack of collaboration among governmental and non-governmental actors, leading to a "re-inventing of the wheel". The general challenge reported is the need to switch from short-term and ad-hoc assessment to long-term and comprehensive agenda planning. In this regard, the LT2050 process may help, which shows that, in part, some CEE governments recognize the need for a long-term strategy.

In the case of Slovakia, also a representative example in terms of how government strategy, significant challenges were discussed by the participants. Mainly how to use TA for policy-making regularly and not only as an ad-hoc tool. One participant reported that, so far, TA activities are mainly carried out in the framework of individual (and primarily international) projects, and there are limited provisions for their continuity. In terms of government policy, as a reaction to the Covid pandemic, ad-hoc advisory bodies to the Government were created. The problem is, however, how to achieve continuity.

Continuity is incredibly challenging in the face of political pressures. In Hungary, the name, composition, responsibilities, and competences of the body that prepares and coordinates STI policies have been changed three times by the same prime minister who has been in office since 2010. In neighbouring Romania, similar to other counties in the region, one participant argued, the landscape is characterized by political unpredictability (as well as policy volatility).

1.6 GENERAL STABILITY AND PREDICTABILITY ISSUES

General stability and predictability issues can be said to challenge the entire European continent, but they stand out as reported by the participating experts, especially in some CEE countries. Hungary seems to be the most significant case, where solid political pressures were reported. Such forces are present in the academic environment broadly. The Hungarian Academy of Sciences was stripped of its entire research network starting in 2019 without much justification or public debate.[12] Since 2021, most public universities have been supervised by boards of trustees appointed by the Ministry of Education. Reports point towards decisions being rushed under intense pressure from the ministry. These boards are composed of politicians (active ministers, secretaries of state, MPs) and other confidants of the prime minister. The members are in office without term limits and transparent appointment mechanisms.

Among the issues discussed, participants also encouraged potential solutions to improve the TA-related policy and institutional contexts across the CEE countries. While political interest in using TA for policy decisions throughout the region may be limited, steps can be (and are being) made in the right direction. Awareness-increasing measures have been discussed, which could be pushed by the EU (through relevant regulations, requirements – similar to the HTA regulatory environment). In terms of the political context, one way to increase TA-related activities is by aligning TA research to respond to specific policy objectives such as, for example, evaluating the impacts of ChatGPT on education in schools if this is a government priority. Most participants stressed the importance of networking, learning, and capacity building through sharing knowledge and information on successful reforms abroad. In this sense, our present initiative hopes to build on past collaborations and make new contacts for establishing an exchange and networking platform for the region.

[12] The new *Eötvös Loránd Research Network* (ELKH) is now in charge of the 15 research institutes, which comprised the research network of the Hungarian Academy of Sciences. The ELKH is led by a 13-member governing board with six delegates of the Academy and six of the Government, and a president jointly nominated by the Academy and the Ministry. See more details here: ***index.hu/english/2019/07/02/hungarian_academy_of_sciences_research_network_taken_away_academic_freedom_ministry_of_innovation_and_technology/***.

2 TA ORGANISATIONS AND ACTIVITIES

By TA activities, we mean an assessment of social and ethical, economic, environmental, and health-related consequences of technological change informed by science, the public, and other stakeholders. In this framing of TA, science-based advice on science and technology issues to parliament and government has a central role in informing decision-making. By assessment and advising we mean processes which are inclusive of diverse stakeholders (politics, economy and the public) and time-frames (short- and long-term). Against this backdrop, section 2.1 describes the structures and processes enabling TA and addressing critical issues from a TA or a related approach, as reported for the CEE countries. In section 2.2 we map the organisational landscape of TA and TA-like activities in the region.

2.1 TA-RELATED ACTIVITIES

The most recent activities on science-based advising at the national level have been concerned with both short and long-term aspects. A recent short-term focus was on informing decision-makers on the coronavirus pandemic (mainly through ad-hoc groups) and, more broadly, its impact on the economy and society. For example, Lithuania has a dedicated programme on safety and technology during the pandemic. Longer term advising has focused on EU strategic priorities and corresponding initiatives, which tended to complement national strategies, such as the Green Deal and the EU approach to artificial intelligence (AI), which are used as a guide for most countries.

The most prominent risk assessment forms are health and environmental risks of technologies and technological change. These also have the longest historical precedents at the national and local (and, more recently, EU) levels. For example, in Croatia, environmental issues have been addressed by the scientific and policy communities, sometimes through intensive interactions with the public, since the 1970s. Most countries also have formal bodies addressing bioethics (for example, Slovakia). Another approach has been to focus (in a one-off manner) on specific technology areas as they arise and become prominent in public debate, such as for example enhancement, nanotechnology, biotechnology, information technology, and robotics (for example, in Slovakia and the Czech Republic).

In university research, long-term scientific engagement with social and ethical consequences of innovation is present, but this occurs mainly at the individual level (for example, in the Czech Republic and Slovakia).[13] At the same time, some countries also have designated research centres for TA-related fields such as STS. Such university departments and research institutes focus on societal issues of biotechnology, artificial intelligence, and energy. They work collaboratively across disciplines, such as sociology, philosophy, social anthropology, political science, law, economics, and environmental science.

[13] Additionally, there are, certainly, at most universities ethics committees for evaluating research proposals, in particular, when the research involves human subjects or animals.

Temporal collaborations in medium- and large-scale EU-funded research projects are one of the main ways to carry out specific TA and responsible research and innovation (RRI) studies (such as in Bulgaria, the Czech Republic and Slovakia).[14] Such project collaborations have focused on fields of study such as digital law, human rights and urban development. Topics were transparency, public participation, transitions and the values and politics of digital technologies (for example, in Latvia's case). This has been especially so within the European Commission's FP7 and H2020 programmes. Methods for inclusion of diverse stakeholders used in these projects have been co-creation, citizen review panels, and engagement with local stakeholders, and local authorities (such as in Bulgaria, Slovakia and the Czech Republic). Recent topics addressed from a precautionary viewpoint in Lithuania and Latvia are the impacts of the coronavirus pandemic and associated learning and medical technologies. For most of these projects, the research and the research network seize once the project ends. Outcomes are rarely if ever, integrated into national practices for inclusion of diverse stakeholders in decision-making processes (there is no 'follow through' outside academia once the project ends).

In most countries, the research is carried out at universities, research institutes (sometimes designated ones), and think tanks. Several research institutions in the respective countries are part of well-established TA and foresight networks (e.g., UNIDO, STOA, ETAG, EPTA, globalTA, and OpenTA), which are often associated with being involved with international research projects (mainly EU) on TA.

Public engagement is not formally implemented at the governmental level in most countries. However, in some, it is part of the government discourse on R&D, foresight and forward-looking outlook studies (such as in Bulgaria and the Czech Republic). Outside government and academia, the leading organisations that engage with the public and act as representatives of public concerns are NGOs, primarily focusing on local environmental issues (such as in Croatia, Hungary, and Latvia).

Right after health and environmental concerns of technical change, the 'hot topics' to do with emerging digital technology innovations are being addressed in all countries, although in different ways. Most countries, rather than having critical or precautionary approaches alongside business-oriented ones, focus primarily on the business aspects, aiming at leading (for example, Estonia and Poland) or catching up (for example, Croatia) with digital innovation.[15]

The disciplinary approaches to technical change that resonate with governments in the selected countries are different but share some similarities. First and foremost is the legal approach by which regulatory and EU directive requirements and standards with regard to the safety of different technology areas are met. The disciplines which closely follow a more general promotion (technology push) of technical change are engineering and economics. The sociological perspective, perhaps most closely and explicitly aligned with a socially and ethically critical view of technical change, tends not to be integrated into the policy discourse in most countries.

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[14] Examples include the EU-funded Projects "Parliaments and civil society in Technology Assessment (PACITA)" (*pacitaproject.eu*), "RRI Tools" (*rri-tools.eu*), "Responsible Research and Innovation in Practice (RRI Practice)" (*rri-practice.eu*), "RECIPES Precaution, Innovation, Science" (*recipes-project.eu*), "Structural Transformation to Attain Responsible BIOSciences (STARBIOS2)" (*starbios2.eu/project-description*), "Scientific Understanding and Provision of an Enhanced and Robust Monitoring System for RRI (Super MoRRI)" (*super-morri.eu*), "Territorial responsible research and innovation through the involvement of local R&I actors (TeRRItoria)" (*territoriaproject.eu/about-the-project/*), "Responsibnle Research and Innovation in Territories (RRI LEADERS)" (*rri-leaders.eu/the-project/*), "Citizen and Multi-Actor Consultation on Horizon 2020 (CIMULACT)" (*cimulact.eu*), "Building a platform for enhanced societal research related to nuclear energy in Central and Eastern Europe (PLATENSO)" (*igdtp.eu/activity/platenso-building-a-platform-for-enhanced-societal-research-related-to-nuclear-energy-in-central-and-eastern-europe/*), "Human Brain Project" (*humanbrainproject.eu/en/*), "Energy Conscious Consumers (ECO2)" (*act4eco.eu*), and "Robotics with and for society (Robotics4EU)" (*robotics4eu.eu/project-overview/*).

[15] The technology areas currently in focus for their innovation potential in Slovenia, as in most other European countries, are AI, synthetic biology, robotics, and the digitalisation of society with regard to blockchain, AI, and IoT.

The countries also differ significantly in the extent and degree TA issues are addressed at the governmental level. For example, the main actors carrying out TA-type activities in the Czech Republic are the government office, which formulates the national R&D strategy, and the new ministry for R&D and strategy (Digital Czechia). Under this institutional framework, new TA and foresight methods, and participatory approaches, are being introduced in strategic and knowledge-based policy-making. In Lithuania, there have been changes in the governmental institutions funding scientific research. Fluctuations in work on TA issues has also been observed. A national Lithuanian strategy process (LT2050) on science, innovation, and education is underway, which covers, among others, AI, biotech, and personalised medicine; this involves finding procedures for practical cooperation between governmental and non-governmental actors.

At the other extreme is Hungary, where the current demand for scientific input into governmental science, technology, and innovation strategies is perceived as low. No active institutional fora for reflection on science and technology issues currently exist. There is a climate of stifling dissensus and critique, and collaborations between researchers, practitioners, policy analysts, and decision-makers are rare. Similarly, in Romania, TA is fragmented, weakly developed and institutionalised; if institutions exist, then there is little evidence of effectiveness. There is a lack of expertise in foresight and the assessment of technologies and their priority seems to be low for the government. Accordingly, there is limited interest and expertise in using TA for policy decisions and no framework is implemented for carrying out TA studies. TA research does not focus on a specific policy objective, and institutional spaces for conducting inter-organisational or inter-disciplinary TA studies are rare.

2.2 ORGANISATIONAL LANDSCAPE

With a few exceptions, there are no formally designated TA organisations in CEE countries. By "formally designated" we mean research institutes or consultancies that either refer to the concept of TA in their mission statements, consider themselves part of the international TA landscape, and/or obviously perform TA activities, even if under a different name. Nonetheless, as we have seen in the previous chapter, there is a diversity of actors who carry out TA-like activities, address salient issues that are also on the agenda of established TA institutions in other parts of Europe, and contribute to better policies in the fields of the environment, health, consumer protection, technology development, and the economy. Still, these TA-like activities often lack an interdisciplinary approach, which is considered essential for traditional TA. The following table gives an overview of organisations the workshop participants and regional co-authors considered relevant in this context (NGOs and HTA organisations are not listed).

Table 1: TA or TA-like organisations in CEE

Country	Organisation
Bulgaria	Applied Research and Communications (ARC) Fund
	Plovdiv University "Paisii Hilendarski" – Applied and institutional Sociology
Croatia	Institute of Social Sciences Ivo Pilar
	University of Zagreb, Faculty of Humanities and Social Sciences, Department of Sociology
Czechia	Centre of Karel Capek
	Faculty of Social Sciences of the Charles University
	Institute of Sociology of the Czech Academy of Sciences
	Technology Centre of the Czech Academy of Sciences (TC PRAGUE)

Country	Organisation
Estonia	Tallin University of Technology, Ragnar Nurkse School of Innovation and Governance
	The Foresight Centre, Estonian Parliament
	University of Tartu, Johan Skytte Institute of Political Studies
Hungary	Centre for Economic and Regional Studies (KRTK)
Latvia	Baltic Studies Centre (BSC)
	Centre for bioethics and biosecurity, Faculty of Biology, University of Latvia
	Faculty of Medicine, University of Latvia
	Department of Humanities, Riga Stradins University
	Latvian Biomedical Research and Study Centre
	Institute of Legal Science, Faculty of Law, University of Latvia
	Faculty of Business, Management and Economics, University of Latvia
	Department of Environmental Protection and Heat Systems, Faculty of Environmental Science, Riga Technical University
Lithuania	ZEF – Association Knowledge Economy Forum
	Committee for the Future of the Seimas
	Center for Strategic Analysis of the Government
Poland	Bureau of Research (BAS) of the Polish Sejm
	Center for Technology Assessment within the Institute for Organisation and Management in Industry ORGMASZ of the Łukasiewicz Research Network (LRN)
	Polish Association for Technology Assessment (PTOT)
Romania	The National University of Political Studies and Public Administration (SNSPA), Politechnic University of Bucharest
	Faculty of Public Administration and Business University of Bucharest
	Institutul de Prospectiva
Slovakia	Slovak Academy of Sciences (SAS)
Slovenia	University of Ljubljana and its various centres of excellency
	Law and ethics centres
	The Slovenian Research Agency (ARRS)

3 THE WAY FORWARD

Against the background of our comparison of how TA issues are addressed in CEE countries and in which cultural and political contexts TA or TA-like activities are taking place in the CEE region, we will now focus on the challenges and drivers for establishing dedicated TA organisations. Again, we base our synthesis on the input from all CEE country presentations.

3.1 BUILDING ON DRIVERS

All CEE countries included in this analysis are members of the European Union. EU activities on various levels seem to play a role in advancing TA in CEE. For example, some are regularly involved in cross-European research projects financed by the European Commission's research framework programs, ERA networks, or Interreg calls. This is particularly the case in Bulgaria, the Czech Republic, and Slovakia, where some institutions seize the opportunity to collaborate, learn, and exchange knowledge. Moreover, in October 2022, TC PRAGUE organized a workshop on Foresight for Research and Innovation Policy with a focus on public engagement and participation in the context of the Czech Presidency of the EU.[16]

For all CEE countries, specific EU regulations, directives, and programmes influence and guide national research policies. While there is no mandate nor a general recommendation to implement TA, some TA-like activities are mandatory in the health sector (cf. HTA – health technology assessment) and the environmental field (cf. EIA – environmental impact assessment, SEA – strategic environmental assessment). They, therefore, contribute to establishing expertise and procedures.

In some countries, the EU Joint Research Centre (JRC) initiative "Science Meets Parliaments" was able to showcase parliamentary TA, for instance, in Slovakia with several special events with MPs and scientific experts.

International professional networks are further significant driving factors. European and global networks can be used to advocate for more TA activities in the CEE countries. EPTA is a case in point as is, the European Association for the Study of Science and Technology (EASST). Additional international networks emerge from collaborative research projects. A Lithuanian research & innovation think-tank was part of the PACITA initiative. However, no systemic change happened until recently, when a parliamentary Committee for the Future was established and became an associate EPTA member in 2021. The Polish Parliament, by contrast, has been an EPTA associate for many years and profits from the international input. The observatory status of some institutions in the EPTA network (Czechia, Slovakia, Bulgaria) also reinforced the network that was initially knot during the PACITA project (see above). One lasting outcome of PACITA is the European TA conference series, with two editions during the official project duration (one in Czechia in 2013) and three more editions afterward (one of which in Slovakia in 2019). The Slovak Academy of Sciences organized, in cooperation with the *Parliamentary Committee for Education*, three panel discussions in the Parliament.[17] However, it proved challenging to secure a continuous parliamentary engagement with TA. In addition, the global TA network in which some CEE organisations are present helps to promote the TA agenda locally (e.g., in Czechia). In Poland, a national TA network is active and helps shape and establish a proper TA community.[18]

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[16] The output of this conference, including a summary, can be found here: *strast.cz/en/news/foresight-in-research-and-innovation*.

[17] On the topics of quality of education, the institutionalization of TA, transnational labour mobility, and industry 4.0.

[18] *ptot.pl*.

From the Czech report, we learn that some governmental bodies, such as the national RDI support agencies, are building on better citizen engagement, civil society principles, and participatory methods, particularly in forward-looking studies. Other driving forces on the path to TA and TA-like activities seem to be NGOs and scholars at universities. However, there seems to be no critical mass to exert pressure on politics in many countries.

3.2 MEETING EXISTING CHALLENGES

Issues surrounding the risks and social consequences of technologies have been addressed for decades, and in many CEE countries as long as in other European countries, especially in the areas of health and the environment (see section 2). However, in many CEE countries, the breadth and depth of the TA field are not well known so far (further empirical research needed). Public political discourse on RRI and TA is lacking almost everywhere. Hence there is no awareness of the potential benefits of TA practice among the political elite and implementing TA or TA-like activities is not (yet) a political priority (e.g., in Croatia, Bulgaria, Romania, and Slovenia). In some countries, e.g., Estonia, the general discourse seems to be oriented toward pro-innovation and technology-push, not leaving much room for critical multi-perspective approaches to innovation, such as provided by TA. In some cases, the rapporteurs noted that decision-makers lack strategic thinking in S&T policy (e.g., Slovenia, Lithuania) or have an outdated approach to expert advisory functions (e.g., Slovenia). Recent research comes to the conclusion that none of the CEE countries had developed system-oriented innovation policy evaluation practices by 2016–2017 (Borrás/Laatsit 2019). The current pandemic, the economic crisis, and the war in Ukraine contribute to a different political focus, neglecting long-term perspectives and challenges of technological developments, the climate crisis, and other pressing issues.[19] Raising public awareness of the TA concept and practice and the potential negative impacts of new technologies could help drive the political sphere to respond with systematic TA activities. In the Lithuanian case, the LT2050 process may also help to switch from short-term ad hoc assessment to long-term agenda planning.

In many CEE countries, public engagement and science communication activities regarding technological development decision-making are informal and rare (e.g., Bulgaria, Estonia, Slovenia). There seems to be a general lack of formal and informal institutional mechanisms to facilitate broader participation and the anticipatory governance of new and emerging technologies. If at all, we saw mainly expert-oriented rather than participatory approaches. An exception seems to be the Czechia, where the national RDI support agencies started building on more and better public/citizen engagement, civil society principles, and participatory methods. Improving methods for broader public engagement as the tool for building trust in science, politics, and European democratic principles and values process is supported by TC PRAGUE. As these aspects are essential features of TA thinking, the challenge is to promote respective expertise and thinking.

Another main finding is that identifying TA researchers and practitioners in CEE is still challenging. Unlike many Western European countries, there is no tight network of TA practitioners at CEE universities and extra-university research facilities. Only individual researchers know the concept or have experience applying it in their research activities, and, at the same time, their potential change agents or champions who may serve as network nodes for the wider TA community, facilitating knowledge transfer in both directions. As reported by some participants, in some cases at least (e.g., Estonia), there is still a lot of progress needed for knowledge on sustainability and ethical implications of technology, for TA to become firmly established. Sustainability and ethics, in general, are, however, interdisciplinary fields that trigger TA thinking. In sum, capacity building through sharing knowledge and training practitioners is – seven years after the end of the PACITA initiative – still on the agenda.

[19] By the way, this is also true in countries where TA is well-established.

For most CEE countries (like Latvia and Slovenia, see section 2), some partial TA or TA-like activities on narrowly focused topics were reported. However, TA-like activities at universities we found were often not framed to directly address the political sphere by answering policy objectives (e.g., Romania) or did not interact closely enough with local and regional authorities from the beginning of a project (e.g., Bulgaria). The challenge would be to broaden the scope and, in the longer run, to formally institutionalize TA, that is, to establish a stable institution with a broader TA mission in research, education, politics, and society. Otherwise, scarce resources are distributed in a fragmented system. Slovakia reports that the potential leading actor in TA, the Slovak Academy of Sciences, lacks adequate human capital and funding resources to build an institutionally-stable TA institution, despite continuously advocating for TA. TC PRAGUE is engaged to find means to institutionalize TA and Foresight in Czechia. Even if tentative or even unsuccessful, such attempts are arguably significant as building blocks necessary for institutionalization processes.

At the thematic level, there is room for more exchange between the local/national projects, on the one hand, and thematically related studies on the European or global level, on the other (reported for Croatia, but valid for many other countries). Often, TA-like activities are carried out in European projects (e.g., in the case of Slovakia) and do not have much resonance at the national level.

In many cases, the governmental agencies and bodies tasked with technology policy in a broad sense seem not well coordinated and cooperate inter-institutionally only in a limited way (reported, e.g., for Romania). Often, there is also a lack of cooperation between governmental and non-governmental actors leading to a "re-inventing of the wheel". By contrast, the Lithuanian LT2050 strategy process is intended to be a learning process of working together.

4 CONCLUDING SUMMARY

This paper presented an overview of the current state of TA activities and institutions in the CEE region. Based on rich and detailed presentations from eleven expert inputs on their respective countries of residence, knowledge of the political and economic contexts and scientific and civic infrastructures was compiled to produce a contemporary account of organizations and activities involved with assessing the consequences of technical change. Our findings show diversity between countries, as well as some similarities, in the infrastructures for TA and how these and related studies are carried out and communicated to decision-makers.

While all countries in the region had different histories and trade linkages and were of very different sizes, the area is broadly associated with similar historical backgrounds of so-called socialism and post-socialism. The period from the 1990s onwards can be characterised by catching-up and pushing forwards in terms of technological innovation and increasing research collaborations, joining the EU, and economic convergence for most countries and regions (with growing regional disparities in and between some countries). The main contextual challenges for taking TA activities forwards in the region include political instability and resource scarcity in some countries. The overall low R&D spending shows this. Civic participation in decision-making on technical change, another essential TA dimension, is also relatively low. NGOs are influential in this role and have grown in number and diversity since the 1990s (in Croatia, for example). In Romania, the *Institutul de Prospectiva* carries out foresight exercises and designs foresight tools for policy formulation. The private sector is also more innovation-active when compared to previous decades. Poland, for example, has a well-developed networking structure that bridges business needs with national scientific competencies. The CEE countries are broadly similar in their level of digitalisation, with Estonia being much more advanced in its acceptance of digital services in e-government, even more so than most countries in Western Europe.

While NGOs and firms are essential in co-shaping technical change, they are insufficient TA infrastructures. The last few decades have witnessed an increase in international EU-funded research projects, which has intensified TA research in the region. Lithuania, Bulgaria, the Czech Republic, Slovakia, and Hungary are most involved in such projects. But however important, research projects are insufficient to provide continuity and follow-through, or to underlie the institutionalisation of the TA field in a country for an extended period. Differences are visible in governmental strategies and institutional support for TA and TA-like processes. Lithuania and Slovakia initiated some steps in the direction, but it remains unknown whether these will be formalised as political changes occur.

A key question in our study concerned the institutions carrying out TA and their activities. Science advising in more general terms has been crucial in all countries due to the coronavirus pandemic in the last few years. A different overarching theme has been the EU Green Deal and the mapping out of a European approach to AI. While HTA and environmental protection are regulated and firmly embedded in all countries, the institutional arrangements for TA more broadly (including a periodic assessment of undesirable consequences of all emerging technology areas, for example) still need to be built up in most national contexts. Still, some countries are already more ahead in this than others. For instance, scientific engagement with innovations' social and ethical consequences is developed in the Czech Republic, Slovakia, and Lithuania. Latvia previously had a designated centre for STS, while currently several university departments focus on bioethics, AI, and the social impacts of the energy transition. EU collaborations in TA and TA-related projects are prominent in Bulgaria and Latvia, as well as in the Czech Republic and Slovakia. Public engagement, however, is not practiced in most countries at the governmental level. It does play a certain role only in Bulgaria and, more formally, in the Czech Republic. Most countries focus on AI innovation and advancement, with Estonia and Poland perhaps the pro-innovation leaders in this region, with less of a critical perspective on technical change by science and the public. Most countries do not have a formal organisation or institution specialising in TA, but numerous actors carry out TA activities. Most of these are not interdisciplinary.

Support for TA in the selected CEE countries, while having different political, economic, and social contexts, is pretty similar. First, continuous international scientific collaborations in research projects are vital to upgrading TA skills and related expertise in all countries, including those with more established TA expertise. However, working together on projects is not enough to sustain TA activities broadly at the national and local levels. While project work is mainly scientific, the drivers required for the expansion of the TA field in a country are and always will be strategic (as many examples in countries in the "Global North" have shown, such as in the US with OTA, for example). As many TA projects focus on the local level, primarily on participation (bottom-up), the link to the national level needs to be created and maintained so that there is continuity (top-down). Second, and relatedly, most countries lack the 'critical mass' to continuously build up skills in TA. For example, almost all countries explicitly report a lack of expertise in science communication to support public engagement in science and technology policy. Third, structures for a connected and consolidated approach to TA are lacking in almost all countries, and these need to be set up to connect the researchers and practitioners who are working on TA-related issues in relative isolation and provide an environment for building up skills and professionalisation in the area of expert-oriented and participatory TA. Also, processes that connect the different organisations and individuals need to be set up internationally and nationally, as these are sometimes lacking.

Against this backdrop, what can we conclude as the best steps to move forward in the direction of more evidence-based, TA-supported policy-making in the CEE countries? As actors from academia and TA units not directly related to the political sphere, our means are limited and can address many of the issues raised above only in an indirect way. However, the TA community is experienced in intercultural, cross-border exchange, and providing learning environments. With the PACITA project, a lighthouse activity fostering knowledge exchange between countries can serve as an example of best practice. In particular, the series of international practitioners' workshops could serve as starting point to help build up momentum. Inducing support for TA and TA-like activities in the political sphere is a common challenge for all practitioners, even in countries where evidence-based policy-making is seemingly well-established.[20] It appears to be a continuous uphill battle to convince new generations of political actors in ever-changing economic, societal, and political circumstances of the benefits of TA. Mutual exchange not only on the best ways to do TA regarding whatever salient topics are at hand but also concerning the link between the TA communities and the political spheres is crucial. Hence, we recommend as a next step the organisation of cross-European learning workshops, for instance, in the framework of the globalTA network, to open up discussions on the improvement of TA capabilities both in Eastern and Western European countries. One way to enrich TA on both sides would be to foster common projects and to promote mutual learning exercises, such as practitioners' trainings and staff exchange schemes. Furthermore, the Western TA community could be more flexible and open-minded when it comes to connecting to specific research groups in CEE that are not yet familiar with the concept of TA, but do similar things – just like it usually does when recruiting research partners locally.

[20] To take just one example, the former Institute for Science and Technology (IST) in Flanders/Belgium has been closed in 2012 after ten years of successful parliamentary TA activities. For other examples, see Nentwich/Fuchs (2021), p. 39.

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