Karlsruhe Institute of Technology

A Cross-European comparative analysis of barriers and opportunities for establishing Technology Assessment as a means of policy advice

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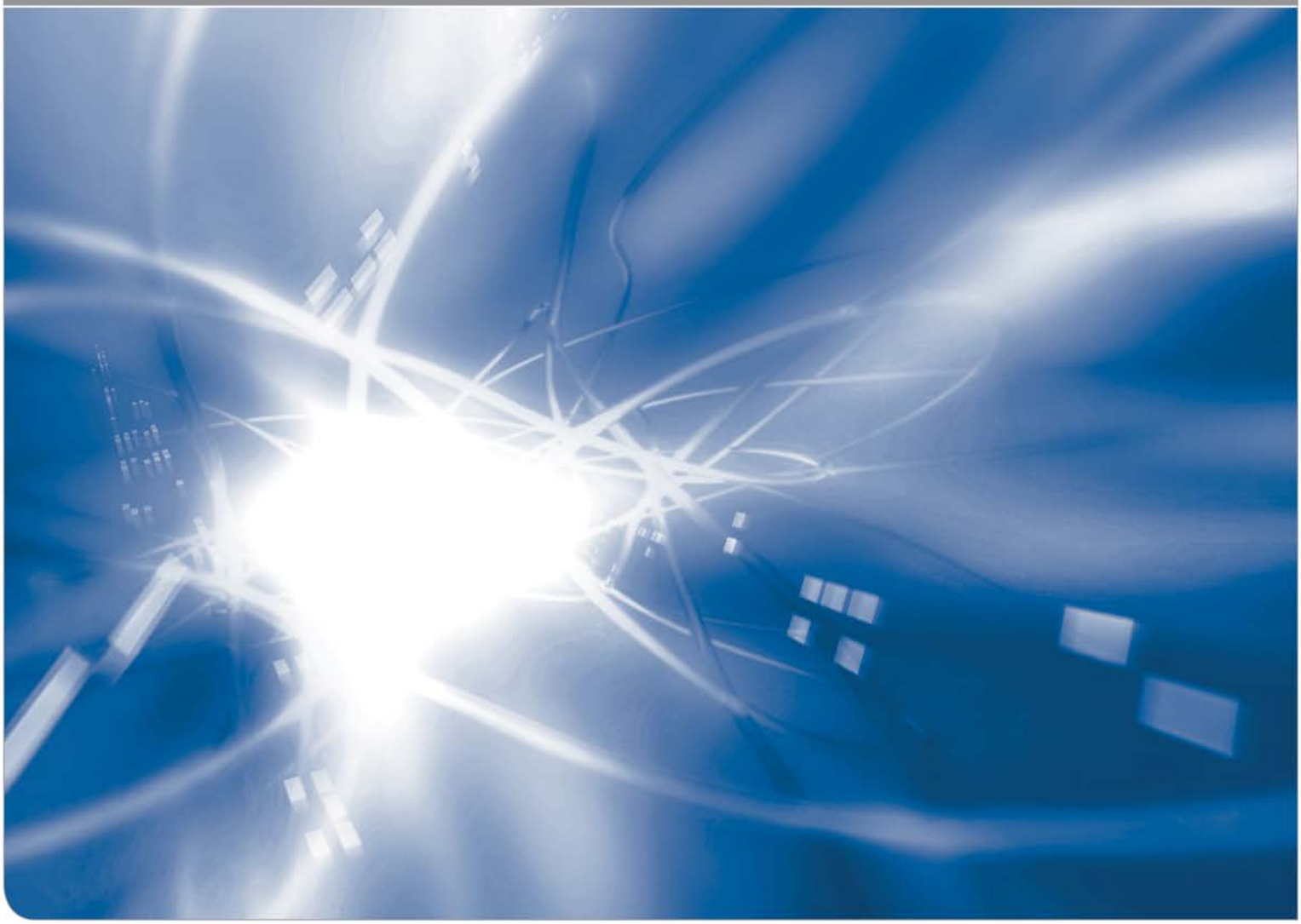

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Summary

The present report is the result of explorative studies on opportunity structures and barriers for introducing and establishing the concept of Technology Assessment in seven European countries which at the level of national R&D policy-making (government and parliament) did not have any TA infrastructure for policy advice established so far. These countries are the Czech Republic, Bulgaria, Hungary, Ireland, Lithuania, Portugal, and Wallonia (Belgium). The exploration of opportunity structures was organised in a way that the exploration itself, at the same time, would initialise reflecting, networking, and possibly planning with regard to national TA infrastructures in the countries explored. This was successfully done by a set of interviews with relevant actors as well as by two workshops with policy makers, stakeholders, representatives of science, public administration, media, and civil society in each of the 7 countries. The findings with regard to existing R&D policy structures and to their workings, with regard to the national S&T system and to existing infrastructures for scientific policy advice as well as with regard to the level of public discourse on S&T were laid down in country studies which were discussed at a comparative workshop held at the Institute of Technology Assessment and Systems Analysis in Karlsruhe, Germany, in November 2012. The present report draws mainly on findings of the country studies and on the discussion at the workshop.

The comparative discussion of the country studies clearly revealed that the situational context for establishing TA in the countries explored differ significantly from the historical situation in the 1970s and 1980s when most of the existing national (parliamentary) TA units in Europe were established . Whereas back in the 1970s and 1980s, S&T were subject to vivid public debates with relevant parts of the general public asking for being involved in decision making, public awareness of S&T policy-making issues is rather low in the countries explored. Other than in the 1970s and 1980s, there is also no expressed demand for unbiased scientific advice for policy making in the field of S&T policy related to problems to legitimise decisions taken in view of the vivid public discourse with often conflicting interests. Furthermore, the countries explored are busy with building up or strongly reforming existing R&D structures with an urgent need for keeping up with the pace of globalisation, whereas 30 years ago the establishment of TA took place in countries with strong R&D infrastructures forming the basis of quite well developed economies and public welfare. Thus, whereas questions of environmental and health risks and the socio-political steering of S&T dynamics in a socially sound way were in focus 30 years ago, today, it is very much about “economy first”, i.e. initialising S&T dynamics and innovation for economic development in a climate of global competition and financial crisis.

Due to this situation TA as a concept is confronted with specific expectations and demands which have to be taken into account when searching for ways to install advisory TA structures:

- With regard to on-going often not well coordinated activities of governments to build up or restructure the R&D system, TA is often explicitly expected to contribute to strategic planning of the R&D landscape and to the evaluation of R&D capacities.

- Setting up innovation policies to improve competitiveness is the central R&D policy issue in the countries explored. TA could position itself, with respect to these activities, by providing support for identifying socially sound and robust country-specific innovation pathways (“constructive TA”) and to contribute to lower costs of trial and error learning.
- Democratic and transparent decision making structures are often not well developed. Part of this is a low profile of parliaments in S&T policy-making as well as a lack of communication among relevant actors. TA could find a role here as an independent and unbiased player to induce communication on “democratic” structures in S&T policy-making among relevant actors.
- “Involving the public” is seen as a challenge by many actors in the countries explored. Motives of democratising S&T policy-making, however, are often merged with “paternalistic” motives of “educating the public” (media, lay people). It has to be clarified to what extent TA’s mission of “stimulating public debate” can adopt that purpose (without becoming “persuasive”).
- A widespread awareness of problems such as in-transparent decision making, lack of trust in democratic structures, lack of competences of relevant actors, bounded rationalities of relevant actors, and lack of strategic long-term thinking often results in an explicit demand for “knowledge-based policy-making”. In this context the (not very well known) concept of TA is welcome as a means to underpin decisions with the best available knowledge in an unbiased manner. Specific ideas about how to institutionally build it into the existing system are, however, missing and it might well be that, in terms of institutional solutions, none of the models so far realised in Europe might be appropriate.

Depending on the country-specific situation, existing models of institutionalisation of TA are taken up by certain actors, such as: establishing a TA function at the parliament or building up TA capacities at scientific institutions (e.g. at the national academies of sciences) as a support for policy-making. The comparative analysis, however, has shown that the national initiatives taken in the countries explored imply new visions for the institutionalisation of Technology Assessment besides the (traditional, but still up-to-date) support of the parliament. As a further step to introduce the concept the “network model” of TA might be most appropriate. This model seems to be of use, especially in the exploration and starting phases of national TA initiatives when serving as a platform to share knowledge and to connect relevant actors. Its practicality, however, has yet to be proven.

It will be a challenge for the TA community to react to this in a way that is supportive for policy-making in the respective countries but, at the same time, it allows for keeping the conceptual core of TA as an unbiased and, as much as possible, as a comprehensive endeavour to reflect on the societal implications of new R&D developments.

As next steps to be taken in order to assure the results that have been achieved by the PACITA project – namely raising awareness on TA among relevant actors as well as instigating first joint reflections on how to adopt the concept in the national context – we suggest:

- To further support on-going networking activities around the concept of TA by further raising awareness on the concept and by identifying possible “TA

entrepreneurs" as well as by supporting reflections on the role of TA in national political settings through further input from existing TA institutions.

- To set up some kind of "prototype activities" like pilot TA-studies, policy briefings, participatory experiments, etc. which, at the same time, can function as a starting point for a collaboration between relevant actors and as mutual methodological learning processes as well as as a show case for the potential of balanced TA analysis.
- "Prototype activities", furthermore, provide a very good basis for further cooperation with the international TA community. Joint work on TA-projects seems to be especially promising in this respect as it allows not only for the development of a shared problem orientation and an exchange and reflection on methodological approaches, but also for a cross-national analysis of specific questions in the fields of science and technology.
- A joint European TA network which would function as an umbrella for existing as well as for newly emerging national TA initiatives would form an important platform for future activities. Such a network could, on the one hand, stabilise emerging TA activities by providing an international framing for the national exploration processes. On the other hand, existing TA institutions would be challenged to react to new demands, new ideas, roles, and functions for TA, thus, providing for continuous development of the concept alongside of emerging new demands. A continuation of the processes that were initiated by the PACITA project thus seems to be promising for both, for existing as well as for newly emerging TA actors in Europe, but also beyond its borders.

Contents

1. Background and aim of the study

The present report is the result of explorative studies on opportunity structures and barriers for introducing and establishing the concept of Technology Assessment in seven European countries which at the level of national R&D policy-making (government and parliament) did not have any TA infrastructure for policy advice established so far. These countries are the Czech Republic, Bulgaria, Hungary, Ireland, Lithuania, Portugal, and Wallonia (Belgium).[1] In this report, the comparative perspective will be used to point out similarities and differences found in the exploration processes. This comparison is based on seven national explorative country studies, which are documented in the report "Expanding the TA-landscape-Country Studies" (Hennen and Nierling 2012). These studies provide an overview of:

- National institutional contexts and existing capacities (actors, organisations, networks, processes, institutions, political system)
- Demands and interests regarding TA related activities
- Barriers and opportunities in national contexts.

In order to initiate these discussion processes, partners who already have a Parliamentary TA institution in their countries ("PTA partners") and partners who do not have parliamentary TA in their countries ("non-PTA partners") have been collaborating. This report summarises the joint participative research activities, of the experienced TA partners of the PACITA consortium from Austria, Denmark, Flanders, Germany, Norway, The Netherlands, and Switzerland with PACITA partners from Bulgaria, Czech Republic, Hungary, Ireland, Lithuania, Portugal, and Wallonia which took place from February 2012 to March 2013. For the joint exploration the so-called "non- or emerging PTA countries" were supported by experiences deriving from PTA institutions as per the distribution list given in Table 1.

The joint exploration of structures allowing for TA initiatives to draw on was performed via interviews as well as by providing a platform for debate on TA among relevant actors – mainly by organising two national/regional workshops in each country/region.[2] The exploration, thus, was not done in a detached analytical, scientific modus but by means that meant to directly intervene in the existing S&T policy-making landscape, inducing networking activities with regard to a future establishment of a national TA community and TA capacities for policy advice. Therefore, the approach can be compared to "action-research" by concurrently investigating the potentials regarding PTA and informing and supporting national TA activities. Research methods comprised document analysis (i.e., national research plans, TA related studies), interviews, as well as discussion rounds with relevant stakeholders ("national workshops"). In total around 10 interviews per country study were conducted with experts from governmental authorities (including parliament),

[1] The report is the result of the work package "Expanding the TA-landscape" within the EU-FP7 project PACITA. PACITA stands for Parliaments and Civil Society in Technology Assessment. It is a four-year research and action plan, funded by the European Commission Framework Program 7, under Theme SiS-2010-1.0.1 Mobilisation and Mutual Learning Actions. The overall PACITA objective is to empower European member states and associated countries with an interest in PTA to make informed decisions about institutionalising, organising and performing Parliamentary TA. At the same time, PACITA is meant to stimulate reflexivity in regions and countries with established Parliamentary TA organisations. In doing so, PACITA helps to improve the quality of knowledge-based decision making on science, technology and innovation in Europe.

[2] For reasons of language convenience it will be only referred to the "national" context and "countries". For the Walloon case, the correct wording "regional" and "region" will be implied by the above mentioned in the following.

industry, science, media, and civil society organisations, each lasting 60 to 90 minutes.

Fieldwork in	By	Supported by
Belgium/Wallonia	Scientific and Public Involvement in Risk Allocations Lab. (SPIRAL), Université de Liege	Centre for Technology Assessment (TA-Swiss), Berne
Bulgaria	Applied Research and Communications Fund (ARC Fund), Sofia	Rathenau Institute (KNAW-RI), The Hague Institute for Technology Assessment (ITA), Vienna
Czech Republic	Technology Centre ASCR, Prague	Institute Society and Technology (IST), Brussels
Hungary	Secretariat of the Hungarian Academy of Sciences (HAS-SEC), Budapest	Danish Board of Technology (DBT), Copenhagen
Ireland	University College Cork (UCC), Cork	Norwegian Board of Technology (NBT), Oslo
Lithuania	Knowledge Economy Forum (KEF), Vilnius	Institute of Technology Assessment and Systems Analysis (ITAS), KIT, Karlsruhe
Portugal	Institute of Technology of Biology and Chemistry (ITQB), Lisbon	Institute of Technology Assessment and Systems Analysis (ITAS), KIT, Karlsruhe

Table 1: Co-working scheme of the explorative country studies

Plans and interim results were discussed with all PACITA partners at the consortium meetings in Brussels (September 7 to 9, 2011), Oslo (February 8 to 9, 2012), and Copenhagen (June 19 to 20, 2012). A two-day international workshop "Expanding the TA-landscape" connected to the consortium meeting in Karlsruhe (November 15 to 16, 2012) was held and included not only the participation of all PACITA partners but was also supported by three experts commenting on the developments in the countries mentioned above.[3] The workshop inputs and the discussion provided general insights on main barriers and opportunities for TA structures in respective national settings. Furthermore, they were used to connect the findings of the national explorations with insights on existing TA practices in Europe and their development. The process was open, providing space for mutual learning between the partners: When starting from a close understanding of PTA as Parliamentary TA during the course of the study and the discussions, the understanding of TA was expanded to include policy advice in the field of S&T for other societal actors.

The comparison of different national settings of TA stands in line with previous analyses of national TA practices especially with regard to its different forms of institutionalisation (Delvenne 2011; Enzing, Deuten, Rijnders-Nagle, van Til 2012; Ganzevles, van Est 2012; Vig, Paschen 2000b).

In contrast to these analyses the exploratory processes presented in this report had very much a practical intent, i.e. initiating Technology Assessment with a special focus on parliaments within Europe in countries of Southern and Western Europe, as well as in new (Central and Eastern) member states. In other terms, our study focussed on the implementation potentials of Technology Assessment in new national contexts. This implementation would affect or even change a specific field of the STI policy-making system.[4]

[3] The three experts were: Prof. Arie Rip (The Netherlands) for the field of Technology Assessment, Prof. Thomas Saretzki (Germany) for the field of Political Science and Prof. Martin Potůček (Czech Republic) for the field of Public and Social Policy.

[4] Hereby STI is understood as science, technology and innovation policy, which are more or less inter-connected policy fields.

The main reference for such an endeavour is the establishment of European PTA agencies in the 1980s and 1990s, documented in Vig, Paschen 2000b.[5] Here, it was already pointed out that for understanding the different modes of institutionalisation of TA it is crucial to take account of the different national settings of Technology Assessment: "…the political motivations for adopting technology assessment varied considerably across nations" (2000a: 17). And further: "the concept as well as the organization of TA took remarkably different forms in different countries. What accounts for these differences? We have singled out institutional and cultural practices as likely determinants of these variations" (Vig 2000: 367). Whereas Vig, Paschen, and others could conclude ex-post from the experiences of already established TA institutions, the approach here is different: We aim at describing the national and political context that is relevant for a TA structure in order to assess which conditions are supportive or hindering factors with regard to an implementation of TA. Thus, this report is unspecific with regard to possible national TA institutions as it rather describes – in a comparative way – national "background factors" and political potentials with regard to a possible institutionalisation at a later stage.

2. Cross-European comparative analysis of establishing PTA

In the following, main aspects of national R&D structures with regard to expenditures, strategies, as well as recent major changes will be reflected in a comparative way. In a second step, public debates on science and technology will be described, including the roles of societal actors, salient topics, as well as of characteristics of science-based policy advice. The chapter will conclude with relevant models as well as with policy options for possible new TA institutions in Europe.

It should be noted that the countries involved in the sample, by no means, share the same level of integration of TA-like activities in their national S&T landscape. The preconditions for adopting TA are, therefore, different in many respects, e.g. regarding the political culture, the institutional settings, the organisational contexts, former experiences with TA-like activities, or regarding actors active in TA. All of these factors can be captured only partly in the comparative perspective.[6] According to the qualitative research design, the national exploration presented in the following is based on the opinions and evaluations stated in interviews with relevant national stakeholders that were selected, analysed, and interpreted by the national partner organisations in the PACITA project. Thus, the findings from the country studies presented here are drawn from the (subjective) evaluation of the national situation by selected national actors. Regarding the authorship of the country studies, it is important to note that the studies represent the perspective of different organisational contexts ranging from academies of sciences (Czech Republic, Hungary) through research centres at universities (Ireland, Portugal, Wallonia) to NGOs (Bulgaria, Lithuania). The evaluation of the different national settings with respect to barriers and opportunities for the development of a TA landscape is, thus, made from a specific organisational perspective in the different countries. The following analysis is based on the national reports (cf. Hennen, Nierling 2012) as well as on comparative

[5] In France, OPECST was founded in 1983, the Technologieradet in Denmark and the Rathenau Institut in 1986, POST in the UK 1989, the TAB in Germany 1989. In 1987, STOA was founded in the context of the European Union. In 1992, TA-SWISS was founded while IST in Flanders was created in 2000.

[6] Please refer to the country studies for more details (summarized in Hennen, Nierling 2012).

studies from the field of political sciences. Thus, the report does not claim to fully reflect the respective national debates neither newly evolving initiatives.

2.1 R&D structures

Historically, TA has been developed in Western democracies when R&D gained central relevance for the economic and the social development of the nation state. Today, in a globalised world it goes without saying that the R&D performance of a country is decisive for its standing in a global economy when it comes to social welfare and wealth creation. “Modernisation”, “Building up a knowledge economy”, “Increasing the innovative capacities of R&D systems”, etc., today, is in all countries on the agenda as a reaction to the salient importance of R&D for economic development and for the growing global competition. For most of the countries involved in our explorative study, the development and the modernisation of national R&D capacities is in the focus of R&D policy-making. Many of them, however, are pursuing STI policies in a particularly difficult situation of transformation of R&D structures as well as of R&D governance.

R&D expenditures

As a view on some basic economic data (see table 2) reveals, most of the countries involved in our study (except for Ireland and Belgium – the latter standing for Wallonia here) are lagging behind the EU27 average development in terms of their GDP (Gross domestic product). And – partly due to the relatively weak economic performance – their expenditures and their investments in R&D are (in some cases significantly) below the EU27 average expenditures in terms of GERD (Gross Expenditure on Research and Development), GDP, and GBAORD (Government Budget Appropriations or Outlays for Research and Development). For the Central and Eastern European countries this is, with no doubt, due to the fact that their economic modernisation is a disappointingly slow and conflicting process, involving political and social tensions.

Portugal and Ireland are in the process of restructuring their economies from domination by agricultural structures to a modern knowledge-based economy (with Ireland having been extremely successful in this respect during the last two decades). Wallonia (Belgium) is the only region/country that apparently holds an average position among Central and Western capitalist economies, especially the region of Wallonia, however, is undergoing a shift from traditional industrial structures (mining and steal) to an S&T-based economy.

	Population 2011 Mio.	Year of EU entry	Democrat. system since	GDP p.C. 2011 Euro	GERD/ GDP % 2010	Private R&D % 2011	Public R&D % 2010	GBAORD 2010 Euro
EU 27	18.61 (tot. 503.7)	-	-	25,100	2.0	61.53	37.51	3,275
BE	11.0	1952	1830/1980 (regions)	33,600	1.99	66.3	32.7	2,153
BG	7.5	2007	1989	4,800	0.6	50.0	48.9	96
CZ	10.5	2004	1989	14,700	1.56	62.0	37.4	873
HU	10.0	2004	1989	10,100	1.16	59.9	38.4	467
IE	4.5	1973	1937	34,900	1.79	68.13	31.9	934*
LT	3.24	2004	1990	9,500	0.79	29.22	70.93	47
PT	10.64	1986	1974	16,100	1.59	45.5	44.13	1,763

Table 2: Core economic and R&D data
Source: ERA Watch (http://europa.eu/about-eu/countries/index_en.htm) and Eurostat 2010
* 2007

For some of the countries, the weakness of R&D infrastructures is revealed by the dominant share of public R&D expenditures (on a relatively low level) compared to private R&D investments. This applies to the former socialist countries. On top of that, R&D structures in post-communist countries were subject to serious cuts that led to a reduction of research capacities in the academies of science and to a reduction of research units in general (Pokorny, Hebakova, Michalek 2012: 64). At the same time, the transformation of public research capacities into private companies or the introduction of economic management principles, in some cases, led to a cut in research capacities due to cost reductions. It is also clear from the data given in table 2, however, that some of the countries already achieved a lot in increasing the share of private R&D expenditures (such as the Czech Republic and Hungary). In most cases, this increase has been achieved by investments of foreign companies. In the Czech Republic, 57%, in Hungary about 60% of the private R&D investments come from foreign companies. The countries involved share a relatively low R&D profile (exception Wallonia/Belgium). They all do a lot to increase activities in R&D and some of them have succeeded in improving their R&D basis – this applies to Ireland as the booming country in the EU during the 1990s but also to Hungary and to the Czech Republic, where R&D expenditures quadrupled from 1995 until today (Pokorny, et al. 2012: 66).

The Western European countries involved in our exploratory study, in many respects, share the economic situation of the Eastern and Central European countries, albeit

for historically different reasons, and are investing significantly in fostering their competitiveness while building up a knowledge-based economy by developing their R&D capacities.

- In the last decade, Portugal had one of the highest growth rates of investment in R&D among the EU member states (Almeida 2012: 227). Not only the public sector contributed to this development but also private investments. In Portugal the share of private investment grew from 27% in 2000 to 47% in 2007, however, it dropped due to the financial crisis in the last years (Almeida 2012: 227).
- Investments in R&D supporting research clusters in advanced R&D areas are an integrated part of Wallonia's efforts to recover from the serious decline of old industrial structures (mining, steal). In a study carried out in 2009, the Belgium federal planning bureau attested perceptible success to Wallonia in recovering from this burden. Compared to other regions with similar structural problems, Wallonia scored high in knowledge production, i.e. its capacity to mobilise resources for research and innovation and with regard to trained R&D personnel. There were, however, still problems in transforming R&D efforts into economic development (Delvenne, Rosskamp, Fallon 2012: 261f.).
- Also Ireland – despite completely different historical conditions – shares the experience of lagging behind in terms of R&D performance and took initiative to catch up with globalisation by investing in R&D. The first governmental R&D strategy in Ireland has been published as recently as 1996. But since then, R&D rapidly gained importance. The rapid economic growth was initially based on the successful implementation of a so called "industrialisation by invitation" policy (attracting investments from multinational firms mostly in the manufacturing sector). Now there is consensus that Ireland has to invest to rebuild itself as a knowledge economy. Ireland has successfully managed to become an attractive location for S&T-based investment. The country is running a national development programme (2007 to 2013) as well as a strategy for science, technology and innovation (2006 to 2013) which underline the perceived importance of R&D. The Irish case illustrates that R&D – as it can also be observed in other countries – is regarded as being an important, if not the most important, instrument for economic growth.

Notwithstanding achievements since the 1990s, countries like Ireland and Portugal still have relatively weak own research capacities and have to improve the science and education system at all levels (O'Reilly, Adam 2012: 145f.). Being in a complex and expensive process of restructuring, the financial crisis hit these countries hard which resulted in a shrinking economy and in high unemployment rates. The heavy burden on public budgets led to a decrease of R&D expenditures. As the investments of recent years were promoted as being the big step to create economic growth and jobs, the recent backlash can be regarded as having caused sobering with regard to science and technology, and thus, caused a decrease of public and political support for R&D policies (particularly reported for Ireland).

In their efforts to build up a knowledge-based economy, the countries explored can (and have to) rely greatly on EU money. EU structural funds money is reported to be the main source of funding of R&D in Lithuania, 10% of structural funds have been spent on R&D (2007 to 2013) (Leichteris, Stumbryte 2012: 185). Wallonia decided to allocate large parts of EU structural funds to building up R&D infrastructures in advanced technology fields (mainly bioscience and biotechnology) (Delvenne, et al.

2012: 259). Also in Portugal EU funds with 400 – 600 Mio € for R&D contribute significantly to the overall spending for R&D of 1.7 billion € (2010) (Erawatch, Almeida 2012: 221). EU structural funds helped to build up new R&D infrastructures as well as PhD programmes in strategic research areas, such as Biotechnology or Nanotechnology.

Modernising the R&D system - economy first

All countries explored have set up national innovation strategies or action plans to modernise the R&D system, to attract private investments and to improve competitiveness. The key targets listed in governmental R&D programmes and strategies in all countries explored can, at the same time, be read as a list of typical deficiencies of R&D governments, infrastructures, and strategies in the respective countries, such as the key targets mentioned in the Bulgarian president's strategic document "Bulgaria 2020: National Priorities in Education and Science" (2012). The targets addressed comprise: prioritisation of young scientists, internationalisation of Bulgarian research, improvement of R&D competitiveness, stimulation of cross-sectoral partnerships, and the development of R&D infrastructures (Kozarev 2012: 32). Areas that are targeted by governmental innovation and R&D funds usually comprise advanced fields of research such as Nanotechnology, Biotechnology, ICT, Renewable Energy, and others.

Planning and investment in R&D clearly are governed by the main goal of building up the economy. The running Science and Innovation Programme in Hungary (2007 to 2013) has as its goals: to create jobs of higher quality, to enhance competiveness, to achieve sustainable socio-economic development, and to improve life quality (Mosoni Fried, Zsigmond, Palinko 2012: 106f.). Thus, building up the economy sets the main frame for R&D policy-making.

Despite prevailing budgetary problems in Ireland, it remains a priority of the government to position Ireland as an international innovation hub in Europe. But the financial problems led to the re-organisation of the R&D government system with the goal to "bring together a streamlined and focussed funding programme for research and development that is aligned with the objectives of enterprise policy" (O'Reilly, Adam 2012: 149). In the focus of R&D policy is the need for "commercialising research and supporting start-ups" (149). The Prioritisation Action Plan (2012) intends to focus the government's 500 Mio € expenditures for R&D on scientific areas with the greatest potential for economic return (O'Reilly, Adam 2012: 149). Efficiency of funding schemes and the improvement of the international competiveness of the country in terms of innovation are also in the focus of the Czech Reform of the Research, Development and Innovation System (2008). The goals of the reform are (Pokorny, et al. 2012: 65): internationalisation of R&D, collaboration of private and public research institutions, evaluation of R&D performance, technology and research transfer to users, simplification of bureaucratic procedures, and deduction of funding sources.

Reform of R&D policy-making and structures

There are new modes and objectives of R&D funding and of government in line with the strategic goals. Funding schemes are shifted to more project-based funding ot the expense of institutional funding. Public-private-partnerships are favoured; technology transfer from academia to industry is fostered. Generally, the focus is on applied research at the expense of basic research. The R&D funding is meant to be

part of the economic strategies such as of support for SMEs and of preventing brain drain by creating jobs for qualified scientists.

Countries are busy with reforming the public R&D system by introducing evaluation schemes to improve the R&D performance. The administration of funding schemes, evaluation, and strategic planning functions are often strengthened by setting up S&T agencies supporting governmental administration (Lithuania, Hungary, Portugal). This is meant to induce more expertise in R&D policy-making which in interviews is, on the one hand, often welcomed by researchers and representatives of academia. On the other hand, it is also criticised because it implies a loss of influence of existing bodies and institutions, especially in Central and Eastern Europe, namely, the national academies of sciences.

The reform process often comprises a complete restructuring of the existing R&D infrastructures and competences of actors. The reform of the R&D system in Lithuania, starting in 2008, led to a higher degree of independence for universities, and the majority of the governmental research institutes was integrated into universities. Competitive funding schemes were introduced and administered by the newly established Lithuanian Research Council which was supported by two new agencies for evaluation and strategic planning (Leichteris, Stumbryte 2012: 184). The setting up of a Technology Agency in 2009 in the Czech Republic accompanied by the introduction of targeted research as a new funding model in the Czech National Research Policy 2009-2015 (Pokorny, et al. 2012: 65) is meant to strengthen an orientation towards applied research – and it showed some effect on public institutions in splitting their activities between applied and basic research (Pokorny, et al. 2012: 64).

The result of reform initiatives is often a complex system of research units, as well as of funding and evaluation schemes, and of administrative authorities and bodies. Ireland's increasing efforts in developing the national R&D structures (since the 1990s) have been accompanied by building up a system of public agencies and institutes, not only administering new competitive funding schemes but also supporting politics with expertise in strategic planning, evaluation, and innovation policies. This includes a cabinet Sub Committee on Science and technology, a Chief Scientific Advisor, an Advisory Council for Science Technology and Innovation, and an Office of Science, Technology and Innovation within the department of Jobs, Enterprises and Innovation. Since 2007 the implementation of Ireland's innovation strategy is overseen by three new research and advisory bodies for technology, higher education, and health research which report to the Interdepartmental Committee.

Lithuania may serve here as a special example for a comprehensive reform of the science system in Eastern and Central European countries. The backbone of the Lithuanian R&D system is formed by 14 universities and five big technological centres, the so called science, valleys that are dedicated to research areas such as biotechnology and ICT. Two ministries supervise and administer 12 national research programmes and funds (such as for biotechnology, new materials, nanotechnology, etc.). The activities are supported by an agency active in monitoring the system and the research performance which gives scientific advice to the government. Three further agencies are responsible for implementing funding schemes. The national academy of sciences is the advisory body to the government with the mission to improve the general public's understanding of science. Publicly funded CSOs, such as the Knowledge Economy Forum, have the mission to improve interchange and

cooperation of stakeholders towards fostering a knowledge economy (Leichteris, Stumbryte 2012: 185ff.). The system, thus, includes elements of strategic thinking, quality control, evaluation and monitoring, as well as institutions taking account of science and society issues.

These modernised structures, however, appear to be functional only to a certain degree. Interviews and workshops revealed scepticism with regard to the effectiveness of newly established systems and strategies by actors from academia, policy-making entities, as well as industry and civil society. In the following, the most important dimensions of the deficiencies are discussed.

Lack of cooperation and split of competences

As in the case of Hungary (Mosoni Fried, et al. 2012: 108), in interviews, we often have found complaints regarding a "fragmented structure of RDI policy-making". In all countries involved in our study, we have found a traditional split of competences between science policy, on the one hand, and technology and innovation policy, on the other hand. Science policy – mainly taking care of higher education and university research – is administered by the science and/or education ministry, whereas, (often newly established) innovation and technology development policies are administered by ministries for economy and development. As put forward in interviews and workshops, complaints about the lack of cooperation between both tracks of R&D policy-making are widespread. This is the case for Eastern and Central European countries as well as for Western European countries. As in Bulgaria the split of competences is accompanied by the fact that great shares of public R&D money are spent for salaries and administration and are not targeted to research projects and infrastructures (Kozarev 2012: 31). For many Eastern European countries it is still the case that the biggest share of R&D funding (reported in official statistics) mainly goes into higher education and less into research. Thus, typically, a country like, e.g., Lithuania is, internationally, ranking highly regarding the percentage of young people in third degree education but, at the same time, does not have appropriate jobs to offer in public and private research activities.

Generally, the split of competences leads to a lack of coordination between strategies of improving third degree education and the development of universities, on the one hand, and of applied research and cooperation between private and public research units, on the other hand. This is amplified by difficulties to generally shift from a centralised R&D system with public research institutes to a more diverse system with a higher level of private research investments. Even if countries are successfully increasing the share of private investment in R&D – as it is reported for Portugal – an interface between private and public research may be missing and the development of the public science system fails to significantly support innovation strategies (Almeida 2012: 229). The split of competences, thus, implies in the most cases that an R&D-based innovation strategy or an R&D-based strategy of economic development is just added as a new strand of policy-making to the existing system of public R&D. Symptomatically, this then often leads to criticism by experts and by policy makers referring to reform strategies as being driven by a short-term perspective of economic growth at the expense of long-term developments of excellent R&D structures (e.g. Hungary, cf. Mosoni Fried, et al. 2012: 111).

New role of the academies of sciences

Initiatives to instigate knowledge transfer and debate on innovation strategies (often funded by EU money) have difficulties to bring their message across or are probably

not fitting in the existing hierarchical structures of policy-making. The Czech reform on research, development, and innovation mentioned above was partly successful but received serious criticism from universities and from the academy of sciences, who regarded the new system as being directed against the established academic system, not allowing its further development but instead mainly supporting private research activities. Further, it was criticised that the reform was aiming at direct economic benefits but not at promoting science as such (Pokorny, et al. 2012: 66).

In Central and Eastern European countries, the academies of sciences, the leading and often the only research institution in communist regimes, obviously still play a crucial role in the R&D reform process. On the one hand, the academies in Bulgaria or Hungary still form the main infrastructure for public research in certain disciplines. They are, however, on the other hand, struggling with hierarchical traditions and are undergoing a process of change by including more competitive elements of research funding. At the same time, they are, at least partly, losing their central role as research performers in the country as well as of being the main and often only provider of scientific advice to R&D policy-making bodies. This implies that reforms of the R&D system have to take account of interests of the academies. The academy of sciences in Hungary, e.g., still has a strong position with regard to resources (13.4% of the total R&D personnel, 11.8% of GERD) but also as an advisory body to the government and to the strategic planning body and host of important research activities. Programmes set up by the academy include long term issues like “future of education”, the energy strategy, “future environment”, or the demography and pension system (Mosoni Fried, et al. 2012: 109). The academy, however, had to undergo serious reforms in 2012 in order to have its capacities concentrated. For example, it established nine new research centres which incorporated the academy’s former 32 institutes. In the Czech Republic, the academy of sciences was drastically reduced to the advantage of the higher education sector, namely, universities (Pokorny, et al. 2012: 67). Some of the criticism against reforms in the Central and Eastern European countries is most probably rooted in conflicts between the new governmentally implemented structures and the old academic system.

Discontinuity and deficient management of reform strategies

Reform strategies are often criticised for lacking focus and for not being supported by a general increase of the budgets for R&D. Criticism, as mentioned above, might sometimes be motivated by the loss of privileged positions of established academies or universities. But, generally, the effectiveness of strategies seems to be compromised by discontinuity and lack of focus mainly due to quickly changing political agendas fuelled by political tactics and by quickly shifting political powers. The Hungarian National Council for Research and Innovation, the main coordinating body in R&D governance with representatives of all R&D agencies and authorities, was dissolved in 2012 and substituted by a “development cabinet” with the Prime Minister and three ministers as its only members (Mosoni Fried, et al. 2012: 102). The multi-stakeholder council is about to be re-established in 2013. The Hungarian innovation office established in 2010 aiming at supporting SMEs with knowledge and technology transfer in order to foster innovation in HU, suffered from a cut of 50% of its budget in 2012 as well as of the loss of its role as a funding body. It now focusses on monitoring and policy analysis (Mosoni Fried, et al. 2012: 109). Discontinuity in setting up reforms due to shifting parliamentary majorities is also reported as being a main weakness of R&D policies in Lithuania. Innovation strategies, thus, often are perceived as ”activism” since they, apparently, result in the constant reorganisation of

strategic planning and advice structures. Each government in Hungary initiated a reorganisation of policy-making- and of advice structures in R&D at least once in their four years term (Mosoni Fried, et al. 2012: 113). The National Innovation Fund in Bulgaria (part of the country's innovation strategy) was functional between 2005 and 2008. After that, the funding activities stopped and new calls have not been announced until late 2012 (Kozarev 2012: 31).

Lack of capacities and transparency

In most of the countries, national councils for R&D have been established. These councils mainly represent academies of sciences, industry, universities, public administration, as well as the non-profit sector. They have been established to coordinate reform strategies and to advise the government. In the case of the Czech Republic, the Council for Research, Development, and Innovation takes over the role of almost a ministry and is, more or less, designed to centralise the system of R&D and even to take over micromanagement tasks (Pokorny, et al. 2012: 69). While research councils mainly represent academia, industry, and public administration, they can be regarded as an element of academic self-administration and of expert policy advice. While industry is involved, this measure also intends to establish closer relations between public and private research bodies in order to improve innovation performance. In the interviews, we often find criticism with regard to a lack of transparency of the councils' work and a lack of resources to fulfil its coordinating tasks. Interviews showed that institutional structures of R&D policy-making are often regarded as not being in a position to really coordinating R&D policies effectively. Furthermore, it is often reported that governance structures are lacking openness, not only with regard to civil society, but also with regard to experts who show dissatisfaction with the performance, the accountability, and the accessibility of advisory structures (e.g. Pokorny, et al. 2012: 70).

Even if processes are formally transparent, e.g. relevant documents for decisions are publicly available and the consultation of experts is organised, a lack of accountability is stated by many interview partners. It appears that administrations act without taking into account arguments and conclusions found in consultations (be it expert or public). Interviewees in Bulgaria report that transparency and accountability of experts' participation in governmental or parliamentary consultations or hearings is rather low (Kozarev 2012: 36). A certain level of distrust from the side of academic experts or other experts in governmental performance appears to be significant in many of the countries explored. In Central and Eastern European countries this might, to a great part, be related to the conflicting character of the on-going and long-lasting political transition period from a non-democratic system to a democratic one.

In Ireland, the reported lack of transparency and public involvement in R&D policy-making might be explained as being rooted in a lack of cooperative traditions and remaining authoritarian political culture clashing with the country's rather new and fast emergence as an R&D economy. The highly developed Irish system of advisory bodies and agencies, thus, apparently, did not open up to the wider public or to stakeholders and has remained a closed deliberative circle of executive branches of the government and of related expert communities.

Role of parliaments

The deficit in terms of societal involvement in R&D policymaking is aptly reflected in the fact that the role of parliaments in R&D policy-making is reported to be quite low in all countries explored. There is no doubt that there are formal structures for

parliamentary debate and decision making in R&D matters (standing committees). Formally, parliaments are of course involved in R&D policy-making by adopting laws or also by supervising public authorities. However, in most of the countries, the focus of parliamentary committees in charge of R&D policy-making is often mainly on higher education and not on R&D and its related economic and social relevance and impact. Parliaments are also reported not to have the resources to feed their debates with the necessary knowledge on R&D issues. Parliamentary committees, in most cases, only occasionally organise hearings to improve the knowledge base of debates. Apparently, also a lack of permanent structures at the interface between science, society, and policy-making, as reported for Portugal (Almeida 2012: 230), is connected to the weak role of the parliaments. Thus, R&D policies are mainly discussed and decided on without general publicity and sufficient transparency to motivate interventions reaching beyond closed circles of experts of academia and of governmental administration.

It is difficult to draw conclusions from the country studies regarding the reasons for the low involvement of parliaments. Explanations given in interviews such as MPs lacking a personal background appear to be somewhat shorthanded. We might rather take into account that the low level of public engagement in R&D issues (as reported in the country studies) and a widespread political consensus on R&D as being a guarantee for the countries' economic development, excludes an interest in thorough deliberation on risks and benefits that might trigger parliamentary debates. Other causes related to political culture and particularities of the political system might apply as well. This might be illustrated by Ireland: The Irish voting system leads to MPs focussing on problems of their constituencies which – as far as no local interests are affected – apparently leads to leaving R&D policy to executive and academic expert communities (O'Reilly, Adam 2012: 150).

2.2 Debates on science and technology in national socio-political contexts

The set of countries, building the basis for the comparative study done here, is quite heterogeneous regarding the political system, its function, and its history. Which criteria count if one wants to assess barriers and opportunities for a TA institution influencing the political process? In the following, we assume that an informed debate on S&T topics in the political sphere as well as in society needs solid democratic structures in function with active citizens demanding transparency and responsivity from the political sphere on S&T issues.

However, to overcome some firmly established judgments on European democracies, it is important to point out that, according to indicators measuring the quality of democracy, some of the "new" democracies have already overtaken some of the European founding members like Italy or France because of weaknesses in their separation of powers (cf. Gabriel, Kropp 2008: 19). Especially with regard to democratic consolidation according to recent political studies, in the meantime, Central and Eastern European democracies including Lithuania, Hungary, and the Czech Republic "no longer differ much" from Western Europe. Also Bulgaria is "well on the way to consolidation, though it is certain that their problems with corruption,

organised crime, and the weakness of the judiciary system cannot be overcome quickly" (Merkel 2010: 20f., also Merkel 2007).[7]

Comparative quantitative political analyses imply that there are very different national political contexts and political cultures which are reflected here in the sample. This also holds true when using recent data from the Eurobarometer more specifically focussed on science and technology that has been used to illustrate some findings in the following (TNS Opinion & Social 2005, 2010).

2.2.1 Public debates on S&T – actors and topics

Strong experts – weak citizens

The country case studies from the new member states and Portugal (namely Bulgaria, the Czech Republic, Hungary, and Lithuania) sceptically report with regard to the public interests in debating S&T issues: S&T topics for debate are only hesitantly taken up by politicians as well as by the public. Generally, a "systematic integration" of S&T issues in a societal discourse including all relevant groups – politics, science, and the public – often seems to be missing.

In the Bulgarian context, one reason for the observed lack of debate, especially by the political side, is seen in the different time horizons of politicians and of scientific and technological developments: Whereas, elected politicians have to deal with the "short time horizon" of their election phase, the "long-term" complexity of S&T topics gives them "no political return". Furthermore, "political benefits" from investments in S&T developments do not occur as they also have a too long time horizon of return (Kozarev 2012: 37). S&T issues are, thus, often taken up in public discussions as a "secondary" topic compared to others, preferably economical ones.

TA case example from Portugal: parliamentary debate on medically assisted procreation

The topic of medically-assisted procreation (PMA) for the first time led to debates on regulatory issues in Portugal in 1986. After a first attempt to approve legal regulation was stopped by a veto of the president in 1999, a law on PMA finally passed the parliament in 2006, 26 years after the first IVF baby was born. In 2012 the parliament decided to seriously assess the 2006 regulation in the light of practical experience and to adapt the regulation according to the current scientific knowledge.

This kind of implicit assessment activity comprised a written opinion produced by two parliamentary rapporteurs and hearings organised by the Parliamentary Committee for Health. The hearings included 6 experts and seven organisations (such as the Portuguese Association for Fertility and the National Council of Ethics). The parliamentary rapporteurs supported their opinion on the draft bills with a technical note based on expert knowledge. This note, however, was lacking a clear indication of the background of experts heard as well as on a transparent presentation of the opinions held by the experts.

The parliamentary Committee for Health requested a report on assisted procreation from the National Council of Ethics for Life. The council admonished deficiencies of the existing regulation, e.g. that, so far, criteria and requirements under which the donation of embryos can be carried out in practice are missing. The council's report states a serious lack of knowledge and data and states that it would have been better the council would have given time to consider the technical and social aspects of the implications of the existing law before expressing a position on the proposed amendments, thus, requesting a proper assessment of the situation given in Portugal.

Further reasons for a lack of "public debates" in S&T issues are identified such as a "lack of a debate culture and debate traditions" in Bulgaria (Kozarev 2012: 37), or a

[7] The on-going changes of the political landscapes have to be of course continuously updated – as the current Hungarian government which limits democratic participation and freedom of press currently shows.

general scepticism with regard to public debate rooted in national political culture in Lithuania. Very often, S&T topics are mostly discussed in expert circles advising the government and its respective ministries. Exclusively relying on expertise in political decision making seems to be also an acceptable approach in Lithuania (Leichteris, Stumbryte 2012: 194) as well as in Hungary where scientific advice is widely used in expert-based advisory boards. In the Czech Republic, it is described that the political sector has a "weak role in the creation of conditions for accepting new technologies and R&D results in society" (Pokorny, et al. 2012: 72). This is also related to the fact that the public is not well informed about political steps and debates leading to decisions about S&T innovation and development. The other country studies also describe and admonish a general lack of transparency in S&T decision making regarding the governmental as well as the parliamentary side.

Although the public is often perceived and reported to "passively" (Pokorny, et al. 2012: 72) rely on political decisions in the field of S&T, S&T issues can still bear the potential of leading to public mobilisation in controversial cases, as reported from the Czech Republic but also from Bulgaria, Hungary, Portugal, and Ireland. In Hungary, for example, national debates on GMOs included street protests which, in some cases, finally led to an open dispute implying quite widespread and rational public and professional debates which, for all participants, surprisingly ended in a national refusal of GMOs.

With regard to citizen participation in the field of S&T, it is reported that, very often, supportive framework conditions are missing. Be it the lack of debate culture on a general level as reported from Bulgaria and Lithuania or the missing of formally established structures for the exchange with the public in the Czech Republic. From Hungary, it is reported that citizen participation has a weak standing especially among policy makers. Nevertheless, it is reported that there are initiatives of social scientists that are experimenting with participatory formats.

The conditions for public debate on S&T seem to be more favourable in Ireland and Wallonia. For Ireland, a growing interest in citizen participation in the last years is reported; this is explicitly expressed by politicians (O'Reilly, Adam 2012: 159) based on actual technological conflicts at the local and regional level. In the on-going political discussion on setting up a TA institution in Wallonia, public involvement is a central topic for involved policy makers. Recently, Wallonia has already had experiences with broad participation exercises regarding brain research and political reforms (Meeting of minds in 2007, G1000 in 2011/2012) as well as regarding a federal citizen conference on nuclear waste management in 2009/2010. These initiatives have been considered as successful and follow-ups are being planned for the future (Delvenne, et al. 2012: 266). Despite this favourable climate for public participation on S&T issues in Ireland and Wallonia, both country reports describe that there is still no widely established practice. In both countries, S&T debates are dominated by expert discussions, whereas public participation plays a minor role and is described as being "unidirectional": an exchange from "scientific experts to policy makers and/or society" without a response from society (Delvenne, et al. 2012: 266).

The findings of the country studies are in line with the quantitative findings of the TNS Opinion & Social (2010: 87). For a broad majority of the respondents from all of the countries analysed here, the involvement of experts (scientists, engineers, politicians) is regarded as the most appropriate way to take political decisions in science and technology. Following this strong expert orientation, the consultation on science and technology issues with the public is clearly regarded as being less important in

Bulgaria, the Czech Republic, Lithuania, Hungary, and in Portugal. Only in Belgium and Ireland public opinion on science and technology appears to be of significant relevance for sound policy-making as, at least, one third of the respondents are in favour of public consultation on matters related to science and technology.

Strong actors on the local level

When considering *who* (what groups of persons or what organisations) is actually active in national science and technology debates, two different kinds of actors are mentioned in all country studies: Scientific or technological experts, on the one hand, discussing S&T on a national level, as well as civil society initiatives on the local level pushing public discussion on environmental or technological issues driven by NGOs, on the other hand. An exception is Wallonia where – apparently partly due to a corporatist tradition of policy-making – industries and labour unions (the collective bargaining) play an important role in the discussion about S&T and take clear positions with regard to the impact of technologies.[8]

However, scepticism prevails regarding the societal role and the political impact of local initiatives. An example is given in the Czech report where it remains unclear whether local initiatives acting on the municipality level have effectively contributed to final municipality decisions. Also the Irish case highlights the strong and important role of local initiatives with regard to environmental issues on the local level but also underlines that there is a problem of making these bottom-up processes being heard and acknowledged by the government (O'Reilly, Adam 2012: 158). In the Portuguese and Hungarian country reports, political strategies are described that even strengthen the role of experts in S&T debates and lower the impact of public lay people. In Portugal, two papers reflect the issue of science, technology, and governance specifically for the Portuguese context[9]. According to these studies, a "tendency to exclude lay citizens from the debate" (Almeida 2012: 234), instead of integrating them, leading to a lower motivation of stakeholders to engage especially with opinions "dissenting from official views" (Almeida 2012: 234) could be observed. Generally, in the country studies it is reported that problems with the integration of stakeholders are rooted in prejudices regarding lay people, which are – as is explicitly stated in the Hungarian report – regarded by policy makers as being "emotional and incompetent" (Mosoni Fried, et al. 2012: 126).

With regard to the development of citizen participation, it has to be pointed out that there are different historical contexts in Western Europe as opposed to the post-communist countries, as can be learned from the Irish and the Hungarian report, respectively: Ireland has a "Western tradition" of social movements especially with respect to a "popular eco-movement" (O'Reilly, Adam 2012: 155) against nuclear power plants becoming active in the late 1970s. In recent years, it occurred that the environmental activism of the local population was still alive and became visible in initiatives against plans for shale gas exploitation (fracking) in Ireland. These initiatives are very strong on the local level and even tend to radicalise their activities when they "remain unheard in the wider national debate" (O'Reilly, Adam 2012: 158).

[8] Whereas in the past Christian democrats have rather been techno-pessimistic and engaged in TA-like activities the socialists were used to consider technology as "unquestioned keystone for social and economic progress", a position that is currently evolving in both political parties and movements (Delvenne, et al. 2012: 266).

[9] Arriscado Nunes, J.; Matias, M. (2004): Agnostic spaces, contentious politics and the trials of governance: Environmental policies and conflict in Portugal. STAGE discussion paper 21 and Arriscado Nunes, J.; Matias, M. (2004): Science, Technology and Governance in Portugal. STAGE discussion paper 22.

In contrast to this Western European history of the environmental movement, in Hungary, exemplifying the situation in post-communist countries, the development of civil initiatives, especially with respect to environmental protection, started in the mid-1980s with the decline of the soviet regime. Although the peak of these social movements was in the end of the 1990s, the groups are still, to some extent, active today, especially in fields of waste management (nuclear, hazardous waste, municipal waste). However, both developments described in Ireland and Hungary show that the influence of citizens' initiatives is restricted and can easily result in disappointment and demotivation: "key decisions were made above their heads" (Mosoni Fried, et al. 2012: 118) as the Hungarian report states.

Comparative studies on political and social participation and on political transparency and responsiveness reveal that there is still a lack of public engagement in post-communist countries compared to Western European countries: Up to now, citizens from Central and Eastern Europe use their rights of political participation only hesitantly. Except in the Czech Republic, also attendance in protest activities occurs less frequently. Political exertion of influence is mostly done via voter participation. According to recent European data (ref. Gabriel, Völkl 2008: 283ff.), the level of participation is highest in Belgium followed by Ireland, whereas Portugal, Hungary, and the Czech Republic have the lowest levels of social and political participation.[10]

TA case example from Wallonia: mobile phone antennas controversies

The case of public controversies on electromagnetic fields illustrates the different levels of regulations in Belgium (federal and regional) and its complex interferences and clarification of competences in the field of "environmental health". On the federal level, after expert consultations according to a precautionary approach, norms which are three times higher than those recommended by the WHO and the EU were set. In 2009, the regulation of environmental health issues was committed to the regional level.

The case rather illustrates an unsuccessful example of citizen participation as at both levels (federal and regional) participation demands of local actors were not met by the government. Rather the strong orientation of the regional authorities towards the federal precautionary norm "contributed to black-box the decision-making process and, additionally, raised resistance" (Delvenne et al. 2012: 278). Generally, public authorities avoided controversies "by closing the spaces" (278) for debates on both levels and, thus, the participation of stakeholders was rather limited during the whole process: There was no institutional forum for interrogation that could have been addressed and no exchange of expertise of social actors. Additionally, there were also uncertainties of the citizens with respect to health issues. The only spaces for participation were "narrowed down […] pretty much downstream the decision-making process" (278). Finally, local actors were frustrated since their demands for negotiation were also rejected on the federal level, and now they continue to "battle" (278) on the local level.

The authors state that a TA institute with an independent character could play an important role to accompany such controversies, possibly preventing a direct political interference in the controversies which might lead – as the case has illustrated – to a "too early or unproductive closure" (278) of social participation demands.

The role of science

It is obvious that the scientific landscape in all post-communist countries of the sample (Bulgaria, Czech Republic, Hungary, and Lithuania) is still very much influenced by the prominent role of the national academies of sciences. This strong role is, for example, described regarding the Hungarian academy that acted as if it were a "ministry of science" (Mosoni Fried, et al. 2012: 124) in Hungary, before the new law on the academy was enacted (1994). Although none of the academies is currently active in the field of TA, at least in the Czech Republic and in Hungary there are traditions of problem-oriented and interdisciplinary research as well as of applying methodologies also relevant for TA (e.g. foresight, future scenarios, indicators for

[10] No information available for Bulgaria and Lithuania from this source.

sustainable development) at the national academies but also at universities. Since 1998, Hungary has had a strong foresight tradition (Mosoni Fried, et al. 2012: 116) and the work of the academy seems to be also focussed on the latest topics of interest for the Hungarian national context like waste management, food safety, climate change, or the red sludge catastrophe in 2010. In the Czech Republic, there were already more concrete experiences with TA and TA like activities as for example the participation of the Czech Academy of Sciences in EU funded projects on TA concepts and methodologies or the establishment of the Czech Council on Health Technology Assessment (HTA) at the ministry of health as well as the Czech participation in various European foresight activities.

TA case example from Hungary: preparation of the National Food Safety Strategy

The Hungarian case study focusses on the development of the National Food Safety Strategy under the coordination of the Ministry for Rural Development. Already in 1993, the ministry integrated experts' expertise in the development of the strategy drawing on the expertise of the Hungarian Academy of Sciences. The Hungarian Food Safety Office, founded in 2003, which cooperated not only at the national but also at the international level, in 2004, launched the First National Food Safety Programme using the expertise of "several hundred experts" (Mosoni-Fried 2012: 132f.). Hungary's entry into the EU caused significant changes in the legislation of food safety. In this process, the role of the national Food Safety Office was more and more strengthened implying a broader legal competence and the concentration of all relevant authorities under one ministry. Again, prominent researchers of the Hungarian academy of sciences contributed to the development of the new national food safety strategy coming in 2013. Hereby, the work of a strategic research programme of the Academy that started in 2008 was used intensively by the ministry, taking "into consideration the same general principles that are outlined in the strategic materials of the Academy" (133). In this latest attempt of implementing national food safety strategies, further stakeholders were integrated who had access to all the relevant files on the website of the ministry. The input was compiled and discussed by all the actors involved in the process: the Ministry, the Academy of Sciences, as well as the National Food Safety Office.

This case study illustrates a successful contribution of scientific experts to governmental regulations in a specific political field coordinated by a ministry. It further illustrates the role of the Academy of Sciences in such a legislative process which is still the strongest actor regarding policy advice in Hungary.

In Lithuania and Bulgaria, the science academies, currently, seem to have a less influential role and also fewer experiences with interdisciplinary and problem-oriented research. In Lithuania, the roles of the academy of sciences and of the research council seem to be more formal. By this, policy advice is provided to the Parliament as well as to the Ministries. However, for the Academy it is more important to take up the mission of promoting science and science literacy in the wider public sphere (Leichteris, Stumbryte 2012: 195). Although experts from the academy critically commented on the on-going *foresight* strategy in Lithuania, supporting the need for science-based policy advice in general, the Lithuanian academic institutions seem to be "passive" (Leichteris, Stumbryte 2012: 195) with regard to S&T topics of national relevance. In Bulgaria, the Academy of Science faces major internal restructuring, at the moment, combined with severe problems in scientific knowledge production which have led to a low public reputation of scientists and, also, to an erosion of trust in scientific institutions in recent years. This low reputation of the science system makes it even more difficult to transform science into a communicable topic in the Bulgarian context, as S&T topics "transpire only marginally within the public discourse" (Kozarev 2012: 43).

In contrast, in Ireland and Wallonia, there are quite a few scientists active in TA-like research fields like problem-oriented applied research in the fields of Science in Society, STS, or environmental studies, including a set of PhD programmes as well

as a range of research institutes working in this field. Similar to this, and of particular interest here, is the Portuguese case since the most active institutions in fields related to Technology Assessment in this national context are academic ones: There is one international PhD-programme running in the field of social sciences and technologies focussing specifically on TA, and there are two TA related stakeholder networks (GREAT[11], Bioscience) which seem to imply a strong academic focus on TA in Portugal (Almeida 2012: 235f.; Moniz, Grunwald 2009).

S&T as subject of social debates

When it comes to specific (contested) topics in the field of S&T which were debated and were received politically as well as publicly in the respective national contexts, the compilation (see below) shows a broad range of issues. The topics which were debated most intensively were environmentally and health-related topics like GMOs, energy policies, waste management, as well as food safety. GMOs raised the most controversial and vivid debates which also implied public resistance in some countries. But also specific implications of technologies like ICTs or ethical concerns in controversial fields like assisted reproduction were debated within national contexts. Furthermore, locally or regionally embedded large-scale technological projects like a dam or an oil pipeline were subject to national interest.

Topics mentioned (the following list is illustrative and not exhaustive):

- GMOs (Bulgaria, Czech Republic, Hungary, Ireland, Lithuania, Portugal, Wallonia)
- Waste management (Czech Republic, Hungary, Ireland, Portugal, Wallonia)
- Nuclear energy (Bulgaria, Czech Republic, Lithuania, Wallonia)
- Food safety (Bulgaria, Hungary, Lithuania, Portugal)
- ICTs (Bulgaria, Lithuania; Wallonia) (Privacy of electronic communication in Bulgaria; e-voting, ACTA-initiative in Lithuania)
- Electromagnetic fields / mobile phone antennas (Ireland, Lithuania, Wallonia)
- (Renewable) energies (Czech Republic, Ireland)
- Shale gas / fracking (Bulgaria, Ireland)
- Assisted reproduction (Bulgaria, Ireland, Portugal) (in-vitro fertilisation; surrogate motherhood esp. Bulgaria)
- Assisted suicide (Bulgaria, Ireland)
- Stem cells (Bulgaria, Ireland)
- NATURA 2000 (Bulgaria)
- Oil pipeline (Bulgaria)
- Water management (Czech Republic)
- Ageing (Czech Republic)
- Dam project (Portugal, red sludge catastrophe in Hungary)

[11] GREAT is a national network on TA with members from the fields of academia, economy, public institutions, as well as hospitals (more information available here: http://avaliacaotecnologia.wordpress.com/).

- Nanotechnology (Ireland)
- Animal experimentation (Wallonia)

TA case example from the Czech Republic: public debates on nuclear waste management

The case study of the search for a nuclear waste disposal site in the Czech Republic exemplifies that despite an often attested lack of the general public's awareness of S&T issues, public reactions can be vivid if it comes to direct local effects of S&T policy-making. It also shows that participatory formats can gain relevance for governance in case of public resistance questioning the legitimacy for decision making processes.

Having set up a first nuclear power plant in 1972 and having 2 nuclear power plants delivering 30% of the Czech Republic's electric power, the country is in need for a final depository of nuclear waste. The search for a deep geological depository started in 1980. According to the government's plan after a research phase for finding a location for the waste disposal, two sites will have to be selected which then will be explored technically for disposal purposes. The responsible authority had committed itself to not start investigation without the consent of the municipalities responsible for the areas chosen. Two environmental action groups together with municipalities have organised public meetings with citizens in affected municipalities as well as local referenda and protest events which lead to a rejection by some municipalities.

The responsible authority in 2010 has set up a "Working group for a dialogue about the deep geological repository" including the participation of representatives of the authority, representatives of municipalities considered as locations for the depository, environmental NGOs, members of parliament, and scientific experts. Officially, the working group is an advisory body of the Ministry of Industry and Trade. There is, however, some criticism that the ministry would ignore the recommendations of the working group. The working group as a participatory body already managed to enforce changes of the atomic law and currently is pushing for a legal right to veto for municipalities against decisions on the disposal site and for a reassessment of its legal status as an advisory body.

Beside the "classical" S&T topics also issues with regard to the development of the science and innovation system were prominently mentioned to be subject of political debate in Bulgaria, the Czech Republic, Hungary, Lithuania, and Ireland. Included are issues like e.g.: national innovation strategies, restructuring and strategic development of the science and education system, or priorities for funding the R&D and innovation system. Obviously, these issues are of high national interest and, in their national contexts, are regarded as a potential topic for TA-like activities. Especially in the new member states there seems to be a high interest and a perceived national need to inform and develop such strategies in order to stay competitive or to further develop economic competitiveness. Up to now, corresponding decisions and debates have been accomplished by governmental agencies with the support of scientific experts. The public has not been included in these debates.

Media coverage and public attention and "public understanding of science" initiatives

As it is well known, media coverage of S&T topics is high on topics that raise political interest and controversy (beyond pure scientific discourse). In Lithuania, for example, media attention was relatively high on those topics that have made it into the political agenda, namely GMOs and food safety and nuclear energy). The same is reported from Wallonia where nuclear power, waste management, sitting conflicts, GMOs, ICTs, and animal experimentation was covered by the media. Also in Portugal, media coverage was highest on environmental topics which implied public controversies on local or national levels, like in the case of waste management. In the Irish report, fracking is used as an illustrative example to show the crucial role of the media initiating and the forming discussions on local and national levels, including lively debates in the Irish Times on the topic.

With regard to “science journalism” (in terms of a specialised branch that is informing the general public about newest developments in S&T), the Irish case hints at structural problems, namely, limited capacities as in Ireland only a small number of journalists focusses on S&T. For the Czech Republic a lack of governmental initiatives is admonished which would “give publicity” (Pokorny, et al. 2012: 73) to the field of S&T. In Bulgaria, an obligatory air time for science at national media channels is regulated in the Radio and Television Act. However, this did not lead to major effects as the format of a popular science show that was developed in this context was televised only for three months. The Bulgarian media coverage on S&T issues is aggravated by the fact that the media seems to be strongly biased by political and corporate interests, only on rare occasions giving analytical background information on scientific and technological issues.

According to data from the TNS Opinion & Social (2010: 10) an average rate of 20% of European citizens are not at all interested in recent scientific and technological developments. From the countries under review here, most of the countries – Belgium 20%, Czech Republic (22%), Ireland (26%), Portugal (35%), Bulgaria (36%) and Lithuania (37%) – are close to or even exceed this rate of disinterest. Only in Hungary (8%) a lower share of citizens is not at all interested in science and technology issues. According to the findings from the Eurobarometer, citizens of the countries under review are also less interested in science and technology issues than the average European. According to the statistics, they read less often articles on science in newspaper, magazines or on the internet than the European average of 19%: Lithuania 17%, Ireland and Hungary 16%, Czech Republic 14%, Portugal 13%, Bulgaria 13%, with only Belgium with 30% being far above the European average (TNS Opinion & Social 2005: 23). The Irish, Portuguese, and Hungarian case studies report on politically animated attempts to raise the interest in science by specific “public understanding of science” approaches. In Ireland, the number of public programmes aiming at a popularisation of science has increased in recent years. The Irish public science programmes are aiming especially at school education (O'Reilly, Adam 2012: 155). Experiences from these initiatives show that an increased interest in science issues can be reached by young, well-educated citizens living in cities (O'Reilly, Adam 2012: 155). For the “larger population, outputs from science create ‘little response, except where they bear on pressing topical issues like health, energy, or environment’” (O'Reilly, Adam 2012: 155). Also in Portugal, in the last years, there have been increased political attempts to communicate science to society. The parliament has supported a campaign for the popularisation of science launched by the national science foundation which included public funded media coverage of recent scientific discoveries aiming at strengthening the communication of science to society (Almeida 2012: 233). The national agency “Ciencia Viva” (“Live Science”) organises together with the Committee for Education, Science, and Culture the “Café Ciencia” in the parliament, where politicians, scientists, and stakeholder discuss on various topics. Furthermore, formats for the communication of science and technology via the media (radio and TV) were publicly supported to strengthen general awareness about science. Also, the Hungarian country study reports about special science popularisation formats broadcasted in the national media. In Hungarian TV, a popular science education programme initiated by the Hungarian Academy of Sciences and a special national TV channel cover scientific issues.

It appears that, as far as government initiatives on science and the public are concerned, approaches guided by the so called “deficit model” of public understanding of science are dominant. The public is regarded as being insufficiently

knowledgeable on scientific issues and science is regarded as needing to be supported by being "popularised". In this respect, the central problem is apparently less a perceived need to educate the public in order to deal with public criticism on S&T issues but to deal with public disinterest in S&T that might interfere with or lack to support governmental modernisation and innovation strategies.

2.2.2 Role of policy advice

Lack of trust and legitimacy

A strong need to improve the current situation of national policy advice is expressed in the Bulgarian and Portuguese reports with regard to the legitimacy and transparency of political decisions as well as with respect to setting up missing communication channels between science, politics, and the public. Bulgarian interviewees were "very critical of the available expertise and knowledge base" (Kozarev 2012: 42) with respect to current parliamentary debates which are not sufficiently equipped for a properly informed decision making process on S&T. In Bulgaria, S&T expertise is typically provided internally by governmental staff at the respective ministries. On rare occasions, external expertise is asked for on an "ad-hoc basis" (Kozarev 2012: 42). However, there is almost no public accessible information available on such expertise. Corresponding to this, a lack of communication channels on science and technology issues between the parliament, the public (NGOs), as well as science and industry is stated.

TA case example from Bulgaria: parliamentary committee for the study of best practices in shale gas exploration and extraction

The Bulgarian case study exemplifies the problematic consequences of premature, badly informed, and publicly in-transparent decision making processes as well as the problems to find ways to introduce TA as a source of independent knowledge-based policy advice in an adverse political culture.

A decision of the Bulgarian government to give a license to a company for exploring shale gas exploitation in Bulgaria led to controversies and public protest. The decision made by the government was obviously not based on broad information on fracking technologies and its probable risks and did not involve the parliament as the body representing the wider public. The decision was motivated by reducing Bulgaria's dependency on Russian gas deliveries. When the issue was taken up and made public by the parliament, the environmental risks of fracking became the focus of public debate. The (again) badly prepared decision by parliament on a moratorium for fracking technologies led to criticism stating that the way the moratorium was phrased would imply a moratorium not only for shale gas fracking but for the use of certain technologies for conventional gas exploitation as well. As a reaction to this situation the parliament decided to set up an ad-hoc inquiry committee of parliamentarians and experts with a mission that can be regarded as parliamentary technology assessment. The committee aimed at assessing uses of technologies for shale gas exploitation in other countries in order to come to conclusions on economically and environmentally useful and feasible shale gas exploitation technologies. The practice of the commission, however, revealed a lack of joint fact finding activities between experts and MPs; many of the MPs were non-active in the committee and the committee's negotiations did not lead to a proper report laying out data and arguments for and against the use of exploitation technologies. The committee's recommendation of rephrasing the moratorium in a way that conventional gas exploitation would not be affected was accepted by the parliament. The committee, however, failed to have any effect on the on-going public debates on risks and benefits of shale gas exploitation.

Also the Portuguese case describes a lack of communication between politics and different stakeholders (Almeida 2012: 234) and points to widespread public distrust in political decision making being rooted in a sound "objective" knowledge. There seems to be a low level of trust in politicians that, very likely, results from a lack of transparency in decision-making processes and in their underpinning information

(Almeida 2012: 234). Although there are a number of institutions that can provide policy advice in Portugal (e.g. a formal advisory body of the government, other national councils), and although there is an occasional demand for scientific advice coming from the political sphere (e.g. the government or parliamentary commissions), there seem to be no institutionalised or "routine" ways for constant policy advice. Communication channels between scientists and policy makers and other potential knowledge providers are not clearly defined. They rather depend on decisions of policy makers to ask for advice and, thus, are characterised as "fragile and dependent on the continuous will of interacting between specific stakeholders" (Almeida 2012: 235).

Strategic planning of science, technology, and innovation

The Czech Republic, Hungary, and to some extent Lithuania seem to have a similar approach to use expert-based policy advice especially for strategic planning and for the evaluation of science and innovation strategies at a governmental level. In the field of science and technology, the government is regarded as the most important actor, while the parliament is assessed as far less important and knowledgeable (see chapter 2.1). In all three countries, a set of institutions exists that give advice to the political sphere (policy makers and government) on a regular basis. In the Czech Republic, a number of expert committees have been established. In Hungary, the institutional setting is fragmented in four ministries that share the powers and responsibilities. The multi-stakeholder National Research, Innovation and Science Policy Council served as the advisory body to the government between 2010 and 2012 coordinating science, research, and innovation policy. It is about to be set up again in 2013. With regard to Lithuania's science, technology, and innovation policies two analytical centres of different ministries were recently founded to substantiate the ministries' decisions.

It becomes apparent that all these institutions give strategic advice with regard to the future developments of research and innovation strategies, whereas, policy advice with regard to future (controversial) technological or scientific development is of minor relevance. An exception here seems to be the Czech Republic that has set up a bioethical commission as well as three expert committees dedicated to different scientific topics (life sciences, technical sciences and engineering, humanities, and social sciences). Furthermore, the example of a civic initiative which fundamentally shaped legislative decisions on the electronic signature by its expertise but also by starting a public discussion shows broader experiences in the Czech science-based policy advice compared to the other countries mentioned above. In Hungary, the National Research and Technology Office launched an initiative in 2007 with the title "Support of National Research and Technological Platforms (NRTPs)" and established 20 NRTPs in areas of importance and perspective for the national economy. Meanwhile, the Hungarian Academy of Sciences has set up 9 strategic committees in the most relevant fields (e.g. safety of food, water supply, information society, energy, etc.) in order to support strategy development and to enhance the dialogue between the interested actors.

The focus on strategic innovation is - as it has been mentioned before (2.1) – motivated by national efforts to improve the competitiveness of the national economy. This is highlighted not only in the Czech Republic, Hungary, and Lithuania, but also in Ireland and Wallonia. In this context, very often, foresight methods are used by governmental agencies to assess the economic strategic planning (see e.g. the

recently published National Research Infrastructure Survey and Roadmap "NEKIFUT" report in Hungary).[12]

TA case example from Lithuania: public debates on the construction of a nuclear power plant

On-going discussions on the use of nuclear energy and on the construction of a nuclear power plant in Lithuania exemplify how deeply entrenched political positions hinder a constructive debate on a viable and socially robust path to the future energy supply. Unbiased analysis and mediation by an independent institution that could help to open up debate and unlock blockades is missing.

Lithuania's "Ignalina Nuclear Power Plant (IAE)" was built from 1972 until 1986 and is now the subject of debates around a new power block to be added to the plant. The history of the plant is rooted in the energy strategy of the former Soviet Union. Since the accident in Chernobyl's atomic power plant in 1986 there is a public debate about IAE because it had been using the same "unsafe" reactor type as it was the case in Chernobyl. "Green" protest against the nuclear power plant was very much linked to the Lithuanian movement for independence from the Soviet Union. The green movement ("green clubs") collected 700,000 signatures against the power plant in 1986. After Lithuania's independence in 1990, the Soviet Union initiated an economic blockade which led to a shift in the debate and to a calming down of the green anti-nuclear protest: The debate about IAE then focussed on whether the plant would be able to support Lithuania's independence from Russian energy supply or not. The debate continued during the process of joining the EU. Since 2005, it appears that changing governmental coalitions supported the development of atomic energy and the construction of a new plant in Ignalina. A Japanese company is foreseen to build the new power block. Then, in 2011, after the nuclear accident in Fukushima, new protest initiatives against nuclear power were launched. A referendum against the power plant was less successful than in the year 1986, but has revealed that a majority of the population is sceptical with regard to the construction plans. Proponents of nuclear power have questioned the validity of the results of the referendum. Apparently, the government is now stuck in a debate characterised by an exchange of all kinds of arguments, claims, and allegations (pros and cons) with regard to issues such as "energetic independence", "security and safety", "economical risks and benefits", as well as the public's perception and preferences. The debate is characterised by mutual allegations of personal (financial) interests, hidden agendas, and corruption. It is symptomatic that colleagues, when doing interviews for the case study, have been asked by stakeholders which side they represent and from whom they receive money (from the Russians or the Japanese).

Policy advice and public controversies

In contrast to Bulgaria and Portugal, where improved institutionalised organisational procedures are requested, or to the Czech Republic, Hungary, and Lithuania, where policy advice mainly aims at strategic planning of science, technology, and innovation, in Ireland and Wallonia, policy advice dedicated to the assessment of certain (controversial) technologies is in place. In the Walloon region, a wide range of governmental advising bodies is active with regard to S&T in different fields, for the purpose of "technology guidance", or in the field of environmental assessment. However, the level of cooperation between the different entities appears to be quite low and their focus is quite specialised.

In Ireland, during the years of strong economic growth, there was a time where there was an *"almost complete absence of parliamentary debate*" on S&T as there was an unquestioned acceptance of Ireland's commitment to science, research, and innovation (O'Reilly, Adam 2012: 158) by both political and social partners. Since the mid-2000s, however, an increase in questioning S&T policies has taken place, also implying an increased interest in "strategic intelligence tools" including TA and foresight with a focus on Ireland's competitiveness on global markets (esp. on a ministerial statement on nanotechnology in 2005, another parliamentary initiative

[12]The Hungarian National Research Infrastructure Survey and Roadmap is available under http://www.nih.gov.hu/strategy/news/nekifut-project-new.

documented in 2006). Driven from another angle was the ambition to take up the topic of biotechnology in 2000 in Ireland where an increased demand for public participation methods was expressed by policy makers in order to provide political options on the basis of "key stakeholder" discussions. More recently, the wish for public involvement was renewed during public upheavals due to the protests against shell gas exploitation in 2012. In this context, policy-makers explicitly expressed their demands and started initiatives to enforce public involvement in policy-making in order to be "better informed when making decisions on issues related to science and technology" (O'Reilly, Adam 2012: 160) by learning about the motivation of local protests and citizens' demands.

TA case example from Ireland: closure of the Irish Council for Bioethics

The short life (2002 – 2010) of Ireland's so far unique independent advisory body on S&T governance, the "Irish Council for Bioethics", exemplifies the precarious situation of independent scientific advisory bodies and how sensitive the issues of unbiased and transparent procedures can be.

The Irish Council on Bioethics was established at the Royal Irish Academy on request of the Irish government in 2002. The council was made up by experts with different backgrounds appointed by the Royal Academy. The members were not asked to represent particular bodies but joined the Council "by virtue of their personal expertise, distinction, and authority". In 2008 the Council had been reorganised as a company limited by guarantee with three directors who appointed the council members. The council's mission then was, apart from identifying and discussing ethical questions, related to advanced medical research to promote public understanding and to stimulate discussion. The council published many valuable reports on issues such as research ethics, GMOs, biometrics, and human biological material. A report on stem cell research published in 2008 was controversially received by the public and the policy makers and (at least) contributed to the Council's closure in 2010.

In their report on stem cell research the council members unanimously supported the legal regulation of stem cell research based on a definition of the moral status of the embryo which attributed significant rather than full moral value to the embryo. This was obviously not in line with positions held by the catholic majority of the population holding that the human embryo has to be protected as a full human being right from its conception. The Council, in preparing its statement and recommendations, invited the general public as well as stakeholder organisations to give input to the council's work by filling in an online or postal questionnaire. The results from this public consultation made apparent that the majority of those taking part did not support the council's definition of the human status of the embryo. The council, in the aftermath of the publication of the report, was confronted with criticism of having ignored the perspective of the majority of the Irish population. The argument of the Council that the consultation was not meant as an opinion poll but just as a means to learn about arguments pro and con stem cell research that could help the independent reasoning of the Council did not help. Obviously the council – apart from being in dissent with a great part of society – did not give enough credit to the input given by citizens and failed to make his mission as a body based on independent reasoning of its members sufficiently clear. It was still received with surprise when the government, in the context of an announcement to save 7.5 billion € of the public budget until 2014, stopped funding the Council. The Council's protest against closure, however, was neither supported by a significant part of the general public nor by expert- or stakeholder communities. The closure of the Council did not contribute significantly to the savings in the public budget, but the council, lacking the backing of strong advocates, was an "easy target". The council "…fell to political expediency and the desire for the government to portray an image of 'waging war' on wastage in public expenditure and in reducing the number of Quangos" (O'Reilly, Adam 2012: 169). Ireland is, up to now, still left with the situation of stem cell research being legally not regulated.

2.3 Policy options and national recommendations for a TA infrastructure

The countries involved have very different preconditions with regard to the political setting described above but also with regard to experiences with TA. For the Central and Eastern European countries involved in the study, it can be stated that the concept of TA is (was?) widely unknown so far – with a few exceptions such as in the

Czech Republic where TA-like activities have been going on at the Academy of Sciences and at the Technology Centre ASCR. Generally, it is quite clear that PACITA had to make relevant actors aware of the idea behind the concept and of its practical workings as a tool of policy advice. Thus, it can be regarded as a first achievement of the PACITA project to motivate relevant actors to jointly discuss the possible role of TA in the context of the challenges they are presently facing in the field of S&T policy-making. There is some indication that this might lead to further activities in terms of exchange about TA among actors and networking activities beyond the PACITA project.

Ireland, sharing some of the problems of developing a strong R&D system with Central and Eastern European countries, nevertheless, has a relatively developed system of S&T policy-making and innovation policies. Here, TA was perceived as something that in terms of strategic planning and evaluation of policy measure exists already. There is, however, a felt need to open up existing structures of knowledge-based policy-making to stakeholder groups and to an attentive general public. Existing TA-like activities and structures are, so far, also not connected to the European TA community.

Portugal again, shares structural problems of the R&D system with the other countries as well as weak or inconsistent structures of democratic S&T policy-making. However, there is a small but vivid network of academic TA researchers and despite (or probably exactly due to) the rather weak role of the parliament in S&T policy-making there already have been initiatives out of the parliament to explore the need and the options of adapting TA as a parliamentary institution. PACITA could connect to these activities and help to re-introduce the TA issue to the agenda of the parliamentary committees.

Wallonia is an exception as there is already a history of TA debate in the political system. There have been several initiatives of setting up TA capacities related to the government and the parliament and, just at the very moment when PACITA started its activities, a decision for setting up a TA institute has officially been made. PACITA here could provide additional space for a further development of the idea and for the specification of institutional options as there apparently is inconclusiveness about the institutional body the TA capacity should be linked with and about who the addressee actually should be: Parliament and government are mentioned as main addressees but there is a vivid political debate on the polity a TA institute should address: Walloon region or Federation Wallonia-Brussels (Delvenne et al. 2012 for more details).

When it comes to policy options, especially with regard to the further development of a TA infrastructure, the country studies propose different paths. These can be summarised in the following classification of countries:

1. Supporters of the parliament (Ireland, Portugal, Wallonia)

In Wallonia, Ireland, and to some extent Portugal, members of parliament or parliamentary committees expressed their interest in TA. Thus, the parliament was selected as the main addressee for TA activities in these countries. In Wallonia, the process is further advanced with a parliamentary decree for TA since 2008. Ireland and Portugal are at the beginning of such a process as both parliaments have expressed an interest in TA. In both countries, the parliaments have a rather weak political role. Whereas, in Ireland, TA is regarded as a possibility to strengthen the role of parliament (O'Reilly, Adam 2012: 162), in Portugal, the advantages of a TA

unit at the parliament is seen as a possibility to support the “political, social, and economic” development of the country (Almeida 2012: 237).

In all three countries, the country studies advise to use existing institutions for future TA activities in order to draw on national academic expertise in S&T. Furthermore, a special interest is expressed to include participatory aspects in a future TA unit, either, in order to first make or, respectively, improve national experiences with methods of participation or to include relevant stakeholders and the public in political decision making in science and technology in the future.

2. The innovative explorers (Bulgaria, Lithuania)

The national recommendations developed for Bulgaria and Lithuania present a new model for a national TA landscape: the network model. In both countries, there were only very few former experiences with TA or TA-like activities. However, during the PACITA activities TA was identified as “an unrecognised need” (Leichteris, Stumbryte 2012: 200) by some of the relevant decision makers. It is seen as the main function of such a network model to raise awareness for S&T topics in society and decision makers in relevant political fields. Both countries consider it to be helpful to start with some kind of pilot project first (as it was also the case in the starting phase of the Parliamentary Office for Science and Technology in the UK, of TA Swiss or the Institute Society and Technology in Flanders, ref. Ganzevlees, van Est 2012) in order to “prove” the national relevance and to increase the understanding about the concept of TA but also about possible “products” of TA.

The two NGOs from Bulgaria and Lithuania participating in the PACITA project are both well connected to the national S&T landscape and draw from their networks to offer relevant expertise and, also, to address decision makers on S&T issues. During the process of exploration, both country studies identified possible windows of opportunity for TA in the current system with regard to a new national innovation strategy (Bulgaria) or with regard to funding options from the European structural fund (Lithuania). Problematic, however, is the lack of academic traditions in the field of interdisciplinary, problem oriented research connected with a current lack of trained personnel in both countries.

3. The institutional traditionalists (Czech Republic, Hungary)

The Czech Republic and Hungary make up a third group. Both countries have in common that the academies of sciences are decisive players in the field of S&T policy; furthermore, the national academies in both countries have been in contact with TA, respectively, with TA-like activities (especially foresight and STS). Both evaluate the “system barriers” (Pokorny et al. 2012: 80) in the current political context as being quite strong and are thus pessimistic about the establishment of a TA unit in the future. Barriers to be dealt with are lacking options for national funding of TA in the current situation, a lack of trained personnel, but also a general lack of interest of the decision making sector in S&T as well as of the public.

The best chances, if any, to build up a TA institution are TA to be integrated into already existing institutions which act at the governmental level with responsibilities in monitoring and evaluation of S&T. Thus, here the specific function of TA would be to support the development of national agendas and strategies for research and technology development. In Hungary, the Academy of Sciences (with its extensive membership) appears to be the only public institution that has the infrastructure and the human resources to investigate policy alternatives related to scientific issues in various strategic areas.

But nevertheless, also in the Czech republic and in Hungary, PACITA could, to some extent, contribute to raising awareness that would lead to a broad scope of implementation options of TA as a tool for improving the knowledge base of policy-making TA and for modernising structures of democratic decision making (Mosoni Fried et al. 2012: 119).

3. Conclusions

3.1 Institutionalising TA in Europe – old and new developments

If we look back at the history of TA, the socio-political context of the 1970s and 1980s (when most of the existing parliamentary TA bodies were set up) it is obvious that in the seven countries explored in the PACITA project the situation is completely different today. Notwithstanding existing peculiarities in the different PTA countries at the time of the first (or second) wave (see also Rip 2012) of TA institutionalisation we regard the following features to have been pertinent in one way or the other for the establishment of PTA in the 1970s and 1980s in today's PTA countries:

- There was a highly developed and differentiated R&D system with a strong and visible commitment of the governments to develop and fund national R&D performance in order to improve or foster international competitiveness of the national economy. S&T was clearly regarded to be a decisive factor of social development which, in the best interest of society, has to be taken care of by the government. This – among other developments – was reflected in the setting up of specific structures in governmental administration (Research Ministries), in growing public funding for R&D, as well as in the increasing salience of R&D issues in many standing committees of parliaments.
- There was a strong (compared to the implicit consensus on S&T in the 1950s and 1960s) and articulated public critical interest in S&T issues. Apart from a more generalised criticism against "industrialisation" or "consumerism", there were citizen initiatives on every political level (from the local to the national) demanding to have a say in planning decisions and R&D politics as these were regarded to interfere with citizen rights. This was, not the least, a reason for the salience of the issue of public participation in TA right from the inception of TA in the US, and even more, later on, in Europe (Hennen 2013).
- In the academic sector, problem oriented research and self-reflexive science gained importance, first in the field of environmental politics, later on in Risk Assessment, Systems Analysis, in the social sciences (STS, risk perception) and in S&T ethics (environmental ethics and bioethics). The term "sustainable development" served as a focus for interdisciplinary problem oriented research. With these activities, a visible and growing fraction of the academic sector was advocating TA-like "hybrid-science" and policy oriented research.
- One effect of these factors was a strong and explicit demand by the policy-making sector for support through the best available scientific knowledge as well as through taking up or dealing with public concerns. In some countries, this manifested itself mainly in demands for a particular support of the national

parliament through the best available and non-partisan scientific advice. In other countries demands for stimulating a vivid (and well informed) public debate and a better connection of parliament and government to on-going public debates was prevailing. This resulted in different forms of institutionalisation of TA bodies in, at, or in relation to parliaments and governments as shown in a previous PACITA report on existing policy related TA practices (see Ganzevles, van Est 2012).

When we look at what the country studies tell us about national R&D systems, democratic S&T governance structures, and about the interest of the general public in S&T it is clear that, today, the societal context in these countries is, to a high degree, different from what was prevailing in the 1970s and 1980s.

- In most of the countries explored, it is not about further development of a strong R&D system but it is on building up new structures or fundamental restructuring of existing structures in R&D. Especially in Eastern and Central European countries, to abandon the heritage of a hierarchical and centralised, bureaucratic system of R&D and to develop towards a more diverse, market-like, and self-governing system of R&D structures is still seen as a challenge. It is much about setting up new funding structures (competitive funding instead of institutional funding) and new agencies for funding, promoting, and evaluation of S&T. The R&D landscape is in transition (for other reasons also in Ireland and Portugal) and it is less about reflection on "protecting" societal needs and values against the dynamics of S&T but about instigating dynamics and exploring innovation paths to generate economic growth, to stimulate social welfare and a better quality of life, and to keep up with globalisation pressures. Social impact of S&T comes into perspective less in terms of environmental or health risks and ethical issues but in terms of supporting societal welfare. Technology Assessment, thus, is expected to provide support through offering strategic thinking on robust R&D structures, options for innovation policies and evaluations of existing structures and practices. It is not by accident that, whereas TA is often not very well known in the countries explored, "foresight activities" had been widely promoted in some of the countries.
- Governments play a central role (ministries for education, economy, and science) in restructuring processes with their setting up evaluation and funding programmes and related agencies as drivers of the process. However, there is apparently no open public discourse on the role of R&D structures for societal development. The process is restricted mainly to administration and experts. Accordingly, parliaments have a rather weak role in this context. In S&T-related parliamentary committees it is often mainly dealt with scientific education and the development of universities – innovation policy as well as shaping and regulating the context of implementation is of marginal parliamentary relevance. With the exception of Wallonia and Portugal, parliaments are not active in taking up TA as a means to strengthen their own role and are often also not regarded as appropriate places for TA activities by TA-interested actors. Often, a lack of democratic structures in S&T policies is perceived, as well as a lack of communication and cooperation among relevant actors (academia, government, parliament, CSOs) – TA then comes into perspective as a means of achieving unbiased information for discourses (as in the case of knowledge-based policy-making or responsible innovation) or as a platform to establish a democratic (public) S&T discourse (independent of reflections on its institutional setting).
- At least for the Eastern and Central European countries involved in the exploration, it applies that a vivid and well-connected scientific community active

in problem oriented research or reflexive S&T research is not visible. Often, there are single chairs active at universities, e.g., in science and technology studies, and at the academies of sciences there is a tradition of philosophical thinking on S&T. We also find “ethics committees” attached to professional associations. Also some activity in environmental research usually can be identified. These activities, however, often appear to be isolated even in the academic sector and a connection with politics, e.g., via advisory bodies or public uptake of results is not visible. Thus, important TA entrepreneurs are missing in those countries. On the other hand, we see that the academic sector complains about not being sufficiently involved in S&T policy-making (especially in the on-going restructuring of the R&D sector), and reactions at workshops showed that “knowledge-based policy-making” is regarded to be a promising concept to support more “rational” policy-making. These notions often are accompanied by “technocratic” connotations. Nevertheless, they are often also coupled with a demand for more transparent, public, and accountable processes of decision making and might thus serve as door openers for TA.

- Other than in the 1970s and 1980s, in Western European countries, S&T is far less an issue of a vivid public discourse and activism of CSOs. Whereas, in Western Europe the present-day relatively low public engagement in S&T debates comes with an established system of professional and public authority bodies dealing with risk and ethical issues, such structures are missing in the countries explored in PACITA (with the exception of Wallonia). For those examples of public controversies reported in the country studies (such as, e.g., the debate about nuclear power in Lithuania) it is often noted that they are characterised by a lack of platforms for constructive interchange of actors including CSOs and lay people: TA is expected to play a role in this respect. On the other hand, “the public” often comes into perspective with complaints about the lack of interest in and knowledge about S&T issues. As much as this might be in line with a well-known attitude of scientific elites and with the prevalence of the so-called deficit model of Public Understanding of Science, this might also indicate a specific problem connected to a lack of trust in democratic structures and with a distance to the political process that goes beyond the usual disenchantment with politics. In all countries explored there is, to various degrees, a lack of tradition in public debates on S&T as well as a relative lack of structural channels or platforms for public debate (including media and CSOs). Thus “stimulating public debate” as a mission of TA may gain particular importance here. This would probably also include aspects of Public Understanding of Science activities, while it may also be more interactive and open-ended. It is also important to relate this TA mission to the actual activities of expert communities and public authorities in building up R&D structures and instigating innovation policies. Debates, thus, might be needed about what “socially sound” innovation actually would mean in the national context and about what the actual role or salience of S&T could be for the development of economy and society.

All in all, TA in the countries explored has to define its role in relation to the following context features:

- On-going often not well coordinated activities of governments to build up or restructure the R&D system. In this respect, TA is often explicitly expected to contribute to the strategic planning of the R&D landscape and to the evaluation of R&D capacities.

- In the context of globalisation and crisis, innovation policies to improve competitiveness are central in the countries involved – "the economy first". TA would have to position itself with respect to these activities by providing support for identifying socially sound and robust country-specific innovation pathways ("constructive TA") and to contribute to lower costs of trial and error learning.
- Democratic and transparent decision making structures are often not well developed. Part of this is a low profile of parliaments in S&T policy-making as well as a lack of communication among relevant actors. TA could find a role here as an independent and unbiased player to induce communication on "democratic" structures in S&T policy-making among relevant actors.
- Apparently, "involving the public" is regarded as being a challenge by many actors in the countries explored. In this respect, motives of democratising policy-making are often merged with "paternalistic" motives of "educating the public" (media, lay people). The latter, nevertheless, may indicate a real problem of broad public unawareness regarding the democratic relevance of S&T politics and it has to be clarified to what extent TA's mission of "stimulating public debate" can adapt to that problem (without becoming "persuasive").
- In all the countries explored, actors from different perspectives highlight problems such as in-transparent decision making, lack of trust in democratic structures, lack of competences of relevant actors, bounded rationalities of relevant actors, lack of strategic long-term thinking. All of this results in an explicit demand for "knowledge-based policy-making" in the context of which the (not very well known) concept of TA is welcome as a means to underpin decisions with the best available knowledge in an unbiased manner. Specific ideas about how to institutionally build it into the existing system are, however, missing. It might well be that, in terms of institutional solutions, none of the models so far realised in Europe might be appropriate. Providing for "independence of" and, at the same time, for "connectedness" to the existing S&T policy-making landscape is asked for. In this respect, ideas like a TA network including different (governmental, scientific, societal) actors and bodies with more or less close relations to policy-making as well as an "NGO model" for TA are discussed.

In general, TA has to be responsive to the given policy context and to the expectations and demands expressed in the countries explored. In this respect, it might also be important for future activities to take account of the fact that TA can be supportive (and organised) on different levels of R&D policy-making activities. The explorative endeavour of the PACITA project has focussed on the "macro level" of national bodies and authorities of policy-making. Supporting activities could, further on, – possibly in the frame of the EU "responsible research and innovation" initiative – also aim at the "meso level" of regional or local bodies or on the "micro level" of R&D strategies developed on the micro level: be it in industrial companies or individual research institutions. By initiating TA activities on different levels, a "distributed structure" of TA could be supported that might be more appropriate for some of the countries explored than heading directly for the setting up of a powerful TA organisation on the national level of policy-making.

On the other hand, "being responsive" to national expectations should not imply to give up a certain (normative) core of TA as a concept. TA – as it was argued by Arie Rip at the comparative project workshop held in Karlsruhe in November 2012 – might be in danger to become an "empty signifier" when responding to any demand for

"rational" decision making and planning that is expressed by policy-making bodies and authorities. TA, as a concept, implies the role of a critical observer of R&D policy-making activities that necessarily asks for some institutional independence in order to provide space for reflection beyond short-sighted political agendas and openness for a broad spectrum of perspectives being applied in assessment processes.

3.2 Open research questions

The activities within the context of PACITA which are presented here represent a specific set of case studies. The knowledge which can be gained from these cases is rich, on the one hand, – as it inspires to discuss new trends in the overall development of TA and shows vividly different national, organisational, as well as personally shaped paths of TA development. On the other hand, the results give way for further questions in the field of TA development.

The influence of national political settings and of cultural contexts

The national case studies have explored national settings and opportunity structures for TA in countries that have their own history and cultural identity that, both very much, shape the political system, the political debate, as well as the political institutions. These issues have already been subject to intensive research in the field of comparative political sciences (e.g. Gabriel 2008; Welzel, Inglehart 2011). Also within the field of science and technology studies and more specifically of TA, it has been reflected on the importance of national contexts and cultural settings and they have been highlighted (e.g. Jasanoff 2005; Sanz-Menéndez, Cruz-Castro 2005; Vig, Paschen 2000a).

Thus, when reflecting on the further development of Technology Assessment within different national contexts, on the one hand, aspects of political culture (legitimacy, effectiveness, responsiveness) should be taken into account: trust in political institutions, satisfaction with democracy, and participation in political processes. On the other hand, the political system itself should come into view: knowledge about the parliamentary systems and their rules and procedures, functioning of further democratic institutions, democratic development and stability seem to be crucial.

Using this information, questions focussing on the role and position of science-based policy advice within political systems should be addressed:

- At which stage of democratic development are needs for science-based policy advice expressed and implemented ("TA on top of fulfilled basic democratic needs")?
- What are main drivers for the wish for independent policy advice? Or more specifically: To which extent can, e.g., dissatisfaction with fragmented decision structures be considered as an important driver or barrier for the implementation of science-based policy advice? And further: to which extent hinders or favours, e.g., public distrust in democratic institutions the implementation of science-based policy advice?

With regard to the role of public debate on technologies and technological controversies, the concept of "Civic Epistemologies" as developed by Sheila Jasanoff (2005) could be instructive. Jasanoff defines the term briefly as follows: "Civic

epistemology refers to the institutionalised practices by which members of a given society test and deploy knowledge claims used as a basis for making collective choices.“ (255). Based on empirical research in the field of biotechnology, she compares different knowledge regimes in the US, UK, and Germany and analyses “culturally specific, historically and politically grounded public knowledge-ways” (249). Her analytical proposal represents a sophisticated tool to picture different national approaches of the diffusion of public knowledge in the political sphere. Even if Jasanoff’s depth of national comparison in a specific technological field cannot easily be reached in other contexts, her analysis points at important questions that should be addressed when thinking about the development of TA in different national contexts:

- How are technological conflicts constructed on a national level?
- How are technologies debated, embedded, and accepted in specific national contexts?
- What are national characteristics of the contribution of scientific knowledge to political decisions?
- What are nation-specific drivers for technological development, what are barriers?
- What is the specific national interplay between the state, the scientific system, and the public with regard to technology?

It might also be asked then to what extent “civic epistemologies” are at all developed in some of the countries explored. For Jasanoff

“…the concept [of civic epistemology] has meaning only if we conceive of public life, in part, as a proving ground for competing knowledge claims and as a theatre of establishing the credibility of state action. In technology-intensive societies, the construction of governmental credibility necessarily encompasses the public production of scientific knowledge.” (258)

Features of civic epistemologies mentioned by Jasanoff (259) are among others: “Styles of public knowledge making” (How are knowledge claims made public? Who is involved in assessing claims?) or “Public Accountability” (How do policy makers find ways to persuade publics that policies and their knowledge claims are right? How are policy makers held publicly accountable? How is trust and credibility established?). It might well be concluded that such features of public knowledge production are absent to a certain extent in the countries explored. As much as S&T policy-making issues are not on the public agenda as a “collective choice”, we might speak of rudimentary forms of civic epistemologies, only. And while Technology Assessment structures, institutions, and processes must be understood as being elements of civic epistemologies, we could ask whether central aspects of the “TA habitat” are just missing.

The science system forms the basis for the production of scientific knowledge to be fed in the political decision making processes. When looking back in the history of the existing TA institutions the science system has played a crucial role. Thus, we would propose to emphasise aspects to understand further TA-development:

- What is the role of national scientific systems and its national characteristics for the development of (new) TA institutions?
- To which extent and how does the lack of problem-oriented and interdisciplinary research impair the further development of (new) TA institutions?

Last but not least, we like to address the civil society as an actor of technology assessment and address the question:

- Which influence does civil society have with regard to the representation of civil society groups (NGOs) or within processes of political participation in different national settings?

"Side-effect drivers" for the institutionalisation of TA

Processes of institutionalisation and the scientific understanding of these processes have been subject to intensive debates reflecting, e.g., its normative foundations (Jaeggi 2009) or organisational and governmental aspects within organisation and state theory (e.g. Scott 2001) While the topic of institutionalisation processes has already been addressed specifically with regard to TA institutions (Vig, Paschen 2000b), the "personal history" in the development of TA institutions has so far been neglected. Thus, when reflecting on these institutionalisation processes, especially the persons acting as "entrepreneurs" should be considered; e.g., who builds up an institution based on own personal networks drawing on one's own personality, charisma, high enthusiasm, and personal preferences that (implicitly) shape the way TA is performed and the organisational structures that are built up within political settings. Thus, the specific role and importance of these "personal entrepreneurs" and of their specific strategies should be considered much more systematically: What can we learn from the history of TA and can we see a similar development again, e.g., in the case of Wallonia? Generally, in future studies it would be helpful to go beyond institutional frames and to use an extended analytical framework to further develop appropriate national strategies for the implementation of science-based policy advice. Especially actor centred approaches would be important in this respect.

Another aspect is the strategic role of funding by the European Union that should be addressed in particular when thinking about the "second (or third?) wave" of Technology Assessment. The research and development funding strategies of the EU, thus, initiate and further shape the development of initiatives like foresight in the past and are actually shaping the development of TA in different national contexts within the project frame of PACITA. Thus, it can be asked whether this approach gives way for an "imposed" procedure, where "existing models" take on a formative ("colonialising"?) role and where original interests of countries are not fully evaluated beforehand. It should be explored in which way this procedure can "sustainably" shape the setup of TA(-like) initiatives, -activities or even -institutions in the long run and how "bottom-up"-initiatives in specific contexts are related to that approach.

3.2 Next steps

The analysis has shown that current political and economic circumstances like the financial crisis, which was mentioned prominently in the country studies, shape very much present demands for and expectations with regard to Technology Assessment. This is true both for existing as well as for emerging TA institutions, underlining the need to constantly reflect on the TA concept and also on the "added value" of TA in today's society.

Further, the analysis has shown that the national initiatives taken in the countries explored imply new visions for the institutionalisation of Technology Assessment besides the (traditional but still up-to-date) support of the parliament. Especially in Central and Eastern Europe, there is a demand for TA to improve functions of research and technology development with a focus on S&T evaluation. The national initiatives in Eastern Europe, furthermore, proposed – besides the three (traditional) models of TA institutions: parliamentary committee, parliamentary office, and independent institute (Hennen/Ladikas 2009, Enzing et al. 2012) – a new national organisation model for TA: the network model. This model seems to be useful especially in the exploration and starting phases of national TA initiatives serving as a platform to share knowledge and to connect relevant actors. Its practicality, however, has yet to be proven. It will be an important task for the TA community to react to these new challenges in a way that is supportive for policy-making in the respective countries but, at the same time, provides for keeping the conceptual core of TA as an unbiased and, as much as possible, as a comprehensive endeavour to reflect on the societal implications of new R&D developments.

The exploration phase of TA in the respective countries is, in its first phase, finished by now. In order to assure the results of the preceding process, a set of measures that is relevant in the national contexts but also reflects future international activities is proposed in the following.

National level

The process described above showed that after the first exploration process a further clarification of goals and needs tailored to national characteristics should take place. In a first step, especially a critical reflection on the activities which took place within the frame of PACITA would be important:

- What is the specific and very concrete need for TA?
- What are the reasons and consequences if there are no current needs for TA identified?

In a second step, an actor-centred evaluation should take place. Network activities should be strategically reflected and further expanded to relevant and interested national actors:

- In which directions can networks be initialised and further expanded?
- What can be done to further support awareness of TA as a useful concept (“ideas do not flow freely”)?
- Which persons can be identified as “TA entrepreneurs”?
- Which organisations can be identified as “TA capacities”?
- In which way can the PACITA consortium further support national activities (beyond the framework of the project)?

In a third step, concrete national measures could be proposed and tested. The measures envisaged should as much as possible head for supporting on-going policy-making processes in a practical way. Thus, further activities to raise awareness and expand networks of TA supporters should include the setting up of any kind of “prototype activities” like pilot TA-studies, policy briefings, participatory experiments, etc. Hereby, it should be cautiously reflected with regard to the national contexts whether it is wise to address national technological controversies (e.g.

nuclear power) which might raise a great political and public attention, on the one hand, but are controversially discussed, on the other hand. An alternative option would be to start with “softer technological topics” (e.g. IT) which might be of interest for a restricted expert group or for stakeholder groups, only, but could, somewhat detached from political conflicts and public debates, experiment with TA methods and show-case the potential of a balanced TA analysis.

International level

Especially the last aspect mentioned above, the setting up of concrete “prototype activities”, provides a very good basis for further cooperation with the international TA community. Joint work on TA-projects seems to be especially promising in this respect as it allows not only for the development of a shared problem orientation and an exchange of and a reflection on methodological approaches but also for a cross-national analysis of specific questions in the field of science and technology.

A joint European TA network that would function as an umbrella for existing as well as for newly emerging national TA initiatives would form an important platform for future activities. Such a network could, on the one hand, stabilise emerging TA activities by giving the national exploration processes an international framing. On the other hand, existing TA institutions would be challenged to react to new demands, new ideas, roles and function for TA, thus, providing for continuous development of the concept alongside emerging new demands. A continuation of the processes which were initiated by the PACITA project, thus, seems to be promising for both, for existing as well as for newly emerging TA actors in Europe, but also beyond its borders.

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