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Cosmopolitan technology assessment? Lessons learned from attempts to address the deficit of technology assessment in Europe

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ABSTRACT

This article examines ineffective efforts to address the Technology Assessment deficit in Europe and asks how TA approaches can spread across diverse socio-political contexts while considering the specificities of receiving environments. Based on participatory observations and in-depth empirical case studies, we draw on Sheila Jasanoff's work and identify a discursive shift from an institutional deficit to a knowledge deficit of TA, co-produced with an asymmetrical form of cosmopolitan epistemic subsidiarity. Our analysis highlights the epistemic supremacy of existing TA institutions, a situation in which newcomers fully consent to become reliant on foreign imports of TA practices and knowledge. We argue to carefully disentangle the normative dimensions and power inequalities of the standardization of TA approaches, as this can threaten the diversity of perspectives of the knowledge produced and, consequently, the effectiveness and legitimacy of public decision-making. We conclude by identifying research avenues into epistemic subsidiarity for TA practice and scholarship.

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Introduction

Nowadays, the production of anticipatory knowledge about the development of science, technology and innovation (STI) is actively sought and organized through specific institutional arrangements and practices. A relevant example of such arrangements and practices has been institutionalized under the label 'Technology Assessment' (TA) since the 1970s, first in North America and then in Western Europe. TA can be defined as a process which includes policy tools and whose objective is the early identification of technological changes and their possible impacts. This process primarily aims to support policy-making. 'It combines an element of anticipation of future developments (of the technology, and its relation to markets and society) and an element of feedback of this anticipation work to relevant decision-making arenas' (Rip 2001, 15512), especially Parliaments (therefore the term 'Parliamentary Technology Assessment', PTA).

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The first PTA that was established was the result of a 'surge of pride' (Mironesco 1997) on the part of members of the US Congress who wanted to rebalance the legislative and executive branches of government by providing the former with an institution that could advise it on science and technology issues. From the 1980s onwards, a European approach to PTA emerged on the basis of what had been done previously in the United States, but considering European specificities, for example by broadening the recipients of the knowledge produced beyond parliament alone or by developing participatory mechanisms (Vig and Paschen 2000; Delvenne 2011). As a result, the term 'PTA' does not only refer to technology assessment institutions that are located within the parliamentary arena, but to all those that serve parliamentary bodies, whether exclusively or not.

The tasks of PTA institutions are manifold, whether they are to produce scientific knowledge that can be directly used by policy makers, to reduce social controversies related to science and technology, or to stimulate public debate on the issues that STI poses for society. In some cases, a PTA is primarily concerned with producing reports highlighting policy options for a particular technology choice. In other cases, a PTA focuses more on the 'scientific, interactive and communicative process, in order to contribute to the formation of public and political opinion on societal aspects of science and technology' (Decker and Ladikas 2004: 4), thus creating additional channels between civil society and the policy-making process (Rip 2001; van Eijndhoven 1997; Joss 1998; Lucivero, Delvenne, and Van Oudheusde 2019).

Beyond their national activities, TA practitioners also invest resources in international coordination and the production of joint expertise (Vig and Paschen 2000; Hennen and Ladikas 2009; Joss and Bellucci 2002; Hennen 1999; Bütschi, Joss, and Baeriswyl 2002; Jurgen and van Est 2012). At the European level, PTA institutions are represented in the European Parliamentary Technology Assessment (EPTA) network within which co-exist different TA organizational models, mission statements, methods and practices.[1] Furthermore, over the last 25 years or so, the successive EU Framework Programs allowed for the development and consolidation of initiatives aimed at sharing experience and exchanging 'good practices' about TA.[2] The exchange of good practices in such transnational spaces also raises the question of the transfer of so-called 'best practices' (Pfotenhauer and Jasanoff 2017) to new countries and contexts, a concern that has recently received considerable attention in innovation studies and science and technology studies (STS).

For example, with regard to Responsible Research and Innovation (RRI), Doezema et al. (2019) were concerned with how such a global concept is translated and transformed in heterogenous national contexts. They asked: '*what values and practices should remain constant as it moves into different contexts, and what elements should emerge from localized engagement around these ideas?*' (Doezema et al. 2019, 324). In a similar vein, highlighting the potential reductions that occur when influential STI concepts are reified rather than challenged or adapted to local contexts, Delvenne and Thoreau (2012, 2017) offered criticisms of specific applications of the widely circulated National Innovation System framework that do not consider '*the situated socio-political contexts and local realities*' (Delvenne and Thoreau 2012, 216). Lastly, Irwin and colleagues interrogated the dynamics of convergence of specific practices across research and innovation policies. In particular, they drew attention to '*the manner in which*

ideas and practices not only travel but also emerge, develop, and are in different ways domesticated' (Irwin, Vedel, and Vikkelsø 2021, 50). As they put it, '*the question of how 'standard' ways of thinking and working are enacted in particular settings – and how specific settings have influence over standard practices and processes – assumes great relevance for research and innovation policy*' (Ibid). Standardization, in their account, means the process by which '*countries with distinctive traditions, institutions and historical contexts adopt a common agenda and toolbox*' (Ibid).

In this paper we want to contribute to these ongoing debates by highlighting the possible standardization TA practices and knowledge[3] norms and its consequences, at a time when the TA community considers that '*expanding the TA landscape to EU 27 is the major challenge for European TA in the coming years*' (PACITA part B: 12). We ask: how can TA approaches spread across diverse socio-political contexts while considering the specificities of the receiving environments? To address this research question, we focus on the case study of a particular project funded between by the European Commission (2011–2015) under the 7th Framework Program: PACITA (Parliaments and Civil Society in Technology Assessment).[4] Although PACITA is not the only initiative that has worked to expand the institutionalization of PTA in Europe, it is relevant to focus on this project as an empirical reference point. Indeed, it has been by far the largest – and best funded – coordinated international initiative in the recent two decades, involving most of the PTA institutions that are allowed to participate in a European project.[5] Concrete examples also show the importance that this project has had for the European TA community. First, during PACITA it has not been organized any more EPTA practitioners training, despite the fact it was an organized tradition of this network, since dedicated resources were provided for this purpose by the PACITA project.[6] Second, the latter also revived a tradition that had fallen into disuse for two decades, that of organizing European TA conferences again, a platform that was considered instrumental for the early development of the European TA community (Scherz et al. 2016).[7] Third, PACITA's popularity has spread beyond traditional TA networks such as EPTA, which have more stringent membership criteria. As a result, an increasingly heterogeneous set of partners started to recognize themselves as belonging to the same epistemic community (Haas 1992), and the idea of creating a more flexible and open global TA network materialized.[8] Lastly, no other European project has been funded on PTA since then by the European Framework Programs.

Grounded in our involvement in the PACITA project and activities, we examine the diagnosis of the TA deficit as it evolved within the framework offered by the project as well as the responses offered for its resolution. By doing so, we do not seek to transform PACITA into a generalizable example but rather to offer useful insights to an interdisciplinary scholarly community that will inform the design of further comparative studies and establish key terms for dialogue with policy-making communities. In the next sections, we present our methodology and detail our approach to fieldwork, before we outline the theoretical underpinnings of 'civic epistemology' (Jasanoff 2005; Miller 2005), i.e. the cultural differences in the production of knowledge and its use in decision making, and 'epistemic subsidiarity' (Jasanoff 2013, 2014), i.e. the question at what level knowledge is produced, legitimized, and understood. Next, we introduce the normative architecture of PACITA, before we analyze the result of various activities initiated by the project and carried out in different national contexts in order to 'expand the TA

landscape'. We find that, facing unsuccessful attempts to increase the number of TA institutions, the diagnosis of institutional deficit (creating new TA institutions in newcomer countries), which was the cornerstone of the PACITA project, mutated into one of a knowledge deficit (making 'universal' TA knowledge available to more countries). We show that this shifting deficit diagnosis was co-produced with the collective achievement of an asymmetrical form of cosmopolitan epistemic subsidiarity. We highlight that insufficient attention to the power asymmetries that remain with the transfer of seemingly transnationally applicable TA practices (i.e. participatory formats) and outcomes (i.e. studies or reports) can lead to reducing the diversity of policy advice and, hence, undermine the effectiveness and legitimacy of public decision making. In our conclusion, we identify promising research avenues into epistemic subsidiarity, that we consider to be crucial for the future of the European and international TA community, its practice and scholarship.

Material and methods

To conduct this research, we opted for multi-sited ethnographic and in-depth empirical case studies. We used an inductive and qualitative research approach based on a comparative case study (Yin 1994; Gottweis 1998; Jasanoff 2005) and thematic analysis (Braun and Clarke 2006). We explored and compared data collected in three different sites: the PACITA project at the European level (spring 2011-spring 2015) and two national sites identified within PACITA as 'non-PTA countries': Portugal and Czech Republic. We sought a diverse sample (in terms of R&D structures and expenditures, local debates on STI, and policy options for new TA institutions) and these two countries were selected based on the national descriptions of the prospects for TA institutionalization in seven non-PTA partners, which were analyzed and refined by the partners under the task 'Expanding the TA landscape', in the first half of the project.

In Portugal, we followed a process in the Parliament that attempted to determine the best organizational form that TA should take in the country, in the particular context of the economic crisis and austerity measures. The country already has its own history of TA (Böhle and Moniz 2015): in the course of PACITA, two groups of actors with different approaches to TA influenced the process, which underwent a series of changes over time, resulting in a flexible understanding and work on the boundaries of TA taxonomies. We found that a rather instrumental understanding of knowledge for 'evidence-based policy-making' jointly emerged with efforts at institutionalizing TA.

In the Czech Republic, until the beginning of PACITA, explicit references to TA were relatively rare. We analyzed how the practice of TA was taken up and combined in a particular organizational setting, the one of the Czech Technology Center located in Prague. The practical arrangements within the institutional and organizational settings of this institute contributed to redefine the local understanding, rationale and focus of TA, for instance with less prominent attention given to negative implications of technology. Furthermore, we found that the hybridization of the practice of TA with other knowledge sources for policy-making was most important for stakeholders and we attend to some possible implications for the broader TA practices and community.

The case studies conducted in Portugal and Czech Republic were based on two research stays (in May-June and September-October 2014) conducted by one of us

during which data were collected with a focus on semi-structured interviews with representatives of the political world (parliamentarians, advisory and regulatory boards, government officials, public decision-makers), local TA entrepreneurs, relevant scientific experts, and other interest groups involved in the developments around TA in those two countries. In total, 39 interviews were conducted (23 in Portugal, 16 in Czech Republic). In each case study, the collected data were transcribed and thematically analyzed (Braun and Clarke 2006) along two dimensions that are key to the institutionalization of TA. We examined the barriers (e.g. insufficient qualification of decision-makers, level of political culture, state capture, inadequate system of management, inhibition of civic engagement) and the opportunities (e.g. qualification of decision-makers, prognostic and strategic studies, civic and professional engagement, communication skills, experience sharing) for effectively institutionalizing a PTA in these countries. These two dimensions were identified in the early analyses of the data collected at the European level, coupled with a specialized literature review (Hennen and Nierling 2014).

At the European level, the two co-authors were equally involved in the PACITA project for its entire duration (2011–2015). We conducted an ongoing ethnographic field investigation for four years, combining on-site participant observation and observant participation[9] (Seim 2021). This resulted in active involvement in numerous international scientific and PACITA-related events: 15 consortium meetings, six specialized workshops to acquire TA skills[10], three parliamentary debates in which established TA directors or practitioners interacted with Members of Parliament from diverse countries (in Copenhagen, Lisbon, and Namur), and two European TA conferences (in Prague in March 2013 and in Berlin in February 2015). In addition, we participated in all the preparatory phases of two participatory cross-European projects, for which we organized a national workshop-scenario on telecare and ageing societies (April 2014) and a national citizen summit on sustainable consumption (October 2014). Both projects were finalized by a policy workshop in Brussels where we participated in the organization and where the results from the different countries were assembled to form European data and presented to a delegation of national and European stakeholders and Members of Parliament.

In parallel, we realized a literature review dealing with theoretical and practical aspects of PTA and we analyzed the official documents produced by PACITA partners (project deliverables, reports, manifesto).

Approach to fieldwork: insertion and careful engagement

From the beginning, our data collection has been based on an assumed position of strong, formal engagement in PTA communities. This position allowed us to collect a great deal of data that would otherwise have remained inaccessible to the researcher, but it also underscores the impossibility of taking a truly outsider position. To overcome what could appear to be a limitation we adopted an original methodological set up to gather and analyze relevant research data. We focused on what Lydahl and Nickelsen (2022) call 'careful engagements', which refers to '*a generative mode of knowledge production that takes place between researchers and their research fields*' .[11] We found heuristic value in the dynamic approach of 'insertion' (Robinson 2010). Robinson defines insertion as an approach '*oriented towards data collection by being around, occasionally probing, and towards creating legitimacy (or at least recognition)*' (Robinson 2010, 30).

The strategy of probing is also advocated by van Oudheusden and Laurent (2013) when problematizing the role of the social scientist vis-à-vis participation exercises. '*Rather than endorsing one approach to participation, we recommend a pragmatic attitude that implies systematic probing of the roles the social scientist assumes vis-à-vis other participants, interests, and objectives, and that enables him to continually adjust his position in view of the particularities of his situation*' (van Oudheusden and Laurent 2013, 3).

Insertion consists of a succession of 'moves' and 'phases' that can be distant in time and location. At first there is 'moving about' that is concerned with entering '*into the substance of the developments and concerns so as to be a legitimate partner*' (Robinson 2010, 29). It consists of desk research, '*visiting and participating in physical spaces where […] development is taking place*' (Robinson 2010, 149), doing interviews but also micro-interactions and informal conversations up to '*meso-level interactions, as in board meetings*' (Robinson 2010, 145). Second, 'moving in' is deepening that interaction with the actors of the studied fieldwork and perhaps contributing with one's presence and analysis. Third, Robinson mentions the phase of 'aggregation and presentation of findings'. This is often a requirement to be granted access to conferences and workshops. For the researcher it is an opportunity to gather comments and feedback from within. It is an added value compared to the (one way) interviews mentioned in the 'moving about' phase. However, aggregation and presentations also hold to risk of '*going native or being positioned in a service role*' (Robinson 2010, 150). As a strategy to avoid this from happening, Robinson suggests that it should be followed by moments of 'moving out'. Moving out is a necessary step to '*maintain the role of researcher/analyst*' (Robinson 2010, 150) and to (re)affirm that role through self-positioning in conversations or '*visibly moving out via aggregation and presentations outside*' (Robinson 2010, 150) the world one studies.

Theoretical underpinnings: civic epistemology and epistemic subsidiarity

Although the difficulties associated with the institutionalization of TA have already received attention in recent STS literature, most studies identify certain prerequisites or necessary conditions to be met in order for TA to be successfully implemented: 'strategic science regimes' (Rip 2002) in the case of Delvenne (2011), 'civic epistemologies' (Jasanoff 2005) for Hennen and Nierling (2014), 'knowledge-based economies' for van Oudheusden et al. (2015) or more generally 'barriers and opportunities' (Hennen and Nierling 2013, 2014). While being very insightful, such research reflects a very ambitious 'explicatory epistemology' (Colliot-Thélène 2004). In these analyses, TA is considered as a dependent variable of which we know a defined number of possible states and variations (institutionalized or not; 'participatory' or 'technocratic'). The latter are affected by explanatory variables such as strategic science, civic epistemologies, knowledge-based economies, forms of government, etc. In such a context, thus, TA remains a relatively fixed reality.

By contrast, in this paper, we subscribe to a co-productionist argument (Jasanoff 2004), according to which the needs for, and specific forms of, TA depend on changes in knowledge regimes and associated forms of governance, and vice-versa. In addition to finding the right institutional model for a particular polity, each PTA organization needs to find its own way of getting policy-relevant knowledge to its own addressees

and according to politically negotiated procedures that are estimated adequate and authoritative in its respective polity. Sheila Jasanoff coined the concept of 'civic epistemologies' (2005) to highlight cultural differences in the knowledge generation process and how that knowledge gets accepted and taken for robust in a given polity. Civic epistemologies are generally defined as '*publicly accepted and procedurally sanctioned ways of testing and absorbing the epistemic basis for decision making*' (Jasanoff 2011, 8). They refer to '*the practices, methods, and institutional processes by which [a] community identifies new policy issues, generates knowledge relevant to their resolution, and puts that knowledge to use in making decisions*' (Miller 2005, 406). Despite trends of globalization and convergence of technological and political processes, these 'civic epistemologies' differ considerably among modern Western nations and communities. Problems appear when these different civic epistemologies come into contact or need to coordinate.

In the tradition of two and a half decades of TA project sponsorship by the European Commission, there has been a certain cognitive convergence between the Science and Society directorate, the TA community and a series of STS scholars around the idea that TA is a vehicle not only for producing, validating and using knowledge for decision-making on STI issues, but also for articulating a European political and cultural identity. In 2009, the MASIS (Monitoring Policy and Research Activities on Science in Society in Europe) report concluded that '*the absence of a common understanding of science in society issues at the European level [is] similar to the absence of a European citizenship as a common identity. These cultural differences are, on the one hand, a challenge for European unification and for further steps towards a European citizenship concerning science in society issues. On the other, this cultural diversity can be (and should be!) regarded as richness*' (MASIS Report, Siune 2009, 16). The authors of this report advocated experimenting with new forms of relationship between science and society in different cultural contexts, and called for the production of a European space through expertise. In the conclusions of the report, which discussed '*the possible emergence of European model for Science in Society*' (Ibid: 64), TA figured prominently in articulating this European space that was then – and arguably still is – lacking: '*[Participatory Technology Assessment activities] can be seen as articulating a European political and cultural identity. Thus, the European model of Technology Assessment is not just instrumentally important, as a good way to approach science-in-society issues, but also normatively important, as something that indicates what Europe desires to be, and might become*' (Ibid: 67).

From this perspective, there has been the emergence of a civic epistemology on the level of the EU and some EPTA members, standardizing ways of doing TA. As a result, in PACITA, addressing the deficit of TA in Europe involved a normative agenda of the type of institutional creation expected, with the parliamentary, permanent, participatory and nationally-bound characteristics of existing TA institutions as a blueprint (see next section). This civic epistemology came into conflict with other civic epistemologies established at the level of nation-states that were supposed to accommodate 'standard' ways of doing TA and develop them optimally for their respective national contexts.

To make sense of the coordination problems between different civic epistemologies, it is useful to draw on another concept proposed by Jasanoff, that of 'epistemic subsidiarity' (Jasanoff 2013, 2014) encompassing the ways in which societies organize their modes of '*public reasoning*' in order to respect their '*communal sensibilities*' (Jasanoff 2013). In

other words, epistemic subsidiarity '*respects 'how' (and not merely the 'what')*' (Jasanoff 2013, 136) of knowledge-for-action. '*Epistemic subsidiarity would in principle allow to subordinate segments of a polity, such as states in a federal union or nations in the international order, to hold on to their ways of knowing and their own collective knowledge on contested issues*' (Jasanoff 2014: 1747).

Jasanoff identified different modes of epistemic subsidiarity. Two are of particular interest for our argument.[12] 'Coexistence' represents a rather relativistic mode of epistemic subsidiarity where different knowledge and governance norms exist in parallel. None impedes on, or dominates the other. Attention is paid to the border management of the different regimes so they do not interfere with one another and are each left intact. Coexistence is about '*keeping things different*' (Doganova and Laurent 2016, 143). This regime builds on '*strict classifications, permitting no mixing*' (Jasanoff 2013, 138). Difficulties arise when those boundaries are crossed or cannot be maintained. When the border management of the coexistence mode becomes increasingly difficult, one alternative mode of epistemic subsidiarity is 'cosmopolitanism'. This regime explores the possibility of convergence of knowledge practices in building a common world. Cosmopolitan epistemic subsidiarity implies greater '*mutual recognition and acknowledgement*' (Jasanoff 2013, 138) of reasons and regulatory choices between different polities. The construction of this common world requires reflection about what needs to remain divergent and 'polity specific' and what can converge or be harmonized. In other words, it is concerned with the establishment of equivalences.[13] However, Jasanoff acknowledges that one major issue in cosmopolitan epistemic subsidiarity is the unequal power between actors (Jasanoff 2013, 138).

Indeed, she underlines that negative effects are also to be expected regarding boundary crossings, because epistemic cosmopolitanism is not always carried out in a balanced manner, respecting the plurality of ways of knowing and modes of public reasoning. While some see a great democratization potential in cosmopolitanism, power is not necessarily equally distributed, nor has it vanished from the equation. Indeed, the risk is that the recognition of mutual standards does not work in both directions and that the standards of more powerful actors actually overrides those of less powerful ones, leading at best to fragile and partial harmonization.

The PACITA project: expanding the TA landscape

The baseline of the PACITA project was the diagnosis of a shortage of Parliamentary Technology Assessment (PTA) organizations in Europe, and PACITA was presented as a coherent set of activities precisely aimed at reducing the deficit. From the outset, the project was organized around the dichotomy between partners qualified as 'experienced' because their countries were already equipped with PTA units (those were described as 'PTA partners'), and partners considered as lacking experience because they came from countries deprived of institutionalized TA capacities (those were described as 'non-PTA partners'). This initial framing defined the latter as needing to 'learn from', or 'catch up' with, more 'experienced' partners endowed with appropriate institutional and participatory expertise. In addition, although the whole consortium was striving to achieve the general objective of promoting TA institutionalization, it was not *any* institutionalization, as the project was conceived in terms that often took

established PTA institutions (single, particularly dedicated to TA, permanent, participatory-oriented, and nationally-bound) as a model.

In the project proposal, PACITA rehearsed a narrative of a certain evolution of PTA practices toward more participation: '*during the 1980s and 1990s in Europe the deliberation model gained importance [over the policy analysis model] and can nowadays be regarded as being dominant in many European countries*' (PACITA Part B: 10). According to this narrative, some countries, and their PTA practices, are considered to have advanced to different extents in this particular process. In addition, a 'participatory' model was regarded as more advanced and as responding to the 'shortcomings of a 'technocratic' TA approach' (PACITA Part B: 12). The '*consultation process toward the public, stakeholders, societal groups and citizens can be regarded as the European 'improvement' on the classical TA model [that first emerged in the US]*' (PACITA Part B: 11).

Likewise, major PACITA activities such as two cross-European projects (see below) were considered 'participatory', i.e. they used methods of stakeholder engagement in scenario workshops or induced citizens to deliberate and vote following the Europe Wide Views (EWViews) methodology.[14] The policy report of the citizen summit on sustainable consumption emphasizes the fact that these actions were designed to build capacity and train the newcomers in such methods, in order to address their lack of participatory expertise: '*The EWViews citizen consultation involved countries with a long tradition of citizen participation as well as countries with little or no experience in this field. In other words, through practice, countries with little experience with citizen participation processes learned from countries with extensive experience. Thus, the consultation aimed at contributing to the institutionalization of such processes Europe-wide.*' (Jorgensen and Juul 2015, 10).

As the project materialized into specific activities, it soon became clear that if one had to summarize the PACITA project, the spontaneous description by the project partners would sound like: 'Further institutionalize Technology Assessment in new countries' or 'Expand the TA landscape'. 'Expanding the TA landscape' was initially a concise task comprising research and engagement activities in the non-PTA countries/regions about the prospects and the obstacles to be overcome to establish TA institutions. After a series of standardized actions (interviews, reports, national workshops held in partnership with PTA partners) it was left up to the local partners to decide on the next best steps to live up to the objective of 'expanding the TA landscape'. It was negotiated with the European Commission's project officer that this particular task would be 'open-ended' and would continue until the end of the project. It would allow the non-PTA project partners to independently and flexibly conduct additional activities that would strengthen the prospects for addressing the institutional deficit of TA in their respective environment. Expanding the TA landscape thus became even more prominently the flagship of the project. The project proposal already mentioned "*white spots' on the European TA map [and] while the European Union has been growing steadily the TA landscape did not do so during the last 10 years.*' (PACITA Part B: 13).

As most activities became subsumed to that general goal, a crucial question rapidly became how to best organize the mentoring of non-PTA partners in order for them to find the appropriate way to institutionalize TA in their respective countries. Overall, it

was a matter of thinking of TA's expansion while leaving the concrete issue of how to institutionally organize a TA capacity to the appreciation and debate of local actors. This idea was for instance captured by the coordinator stating that: '*TA should be institutionalized in all European countries […] The diversity in cultures and political contexts in Europe call for national implementation of TA in ways which are optimal for the single nation*' (Klüver, Nielsen, and Jørgensen 2016a, 15).

Facing the lack of success in installing new PTA units: from institutional to knowledge deficit

At the beginning of the PACITA project, in a European parliamentary debate organized at the Danish Parliament in 2012, one PTA director referred to the documentation of existing practices as a 'cookbook' of TA. Metaphorically speaking, it would contain a list of inspirational recipes and procedures to apply in order to build a TA organization adapted to national peculiarities and, by doing so, to resorb the deficit of TA in Europe. The writing of this 'cookbook' to document existing TA practices was achieved by pairs of partners, gathering one PTA and one non-PTA partner each, and the results often served as a blueprint for the exploration activities in the non-PTA countries. However, moving to the culinary practice proved to be more difficult than expected: while various activities were successfully conducted in the eight non-PTA countries represented in the PACITA consortium, and despite fruitful exchanges in documenting, training and debating TA across Europe, no new PTA units were created in the course of the PACITA project. The reasons for the lack of success in installing new TA institutions in particular national or regional contexts were often explained by cyclical and contextual elements, such as the hazards of power politics, the aftermath of the financial crisis or temporary measures of budgetary austerity. But they also led the partners to change their narrative.

At the European level: at least, make the TA knowledge travel

In light of persistent institutional absences, ineffective efforts at institutionalizing (P)TA[15] ended up as a fundamental challenge for the partners, who were eager to show that, in one way or another, it was more necessary than ever to continue efforts to expand the TA landscape. Toward the very end of the project, a 'TA manifesto' was written to argue *'for the necessity of European political support of future efforts to expand technology assessment (TA) capacities in the European member states'* (Klüver, Nielsen, and Jørgensen 2016b). In 2015 at PACITA's European TA conference in Berlin, in a welcome statement imbued with epistemic cosmopolitanism that was intended to summarize the results of the entire project, the coordinator insisted on the mutual and bidirectional learning to stress that equivalences were created via flows of experience in both directions. The situation was presented to the audience as if everyone had learned equally from one another.

To a considerable extent, independently of the obstacles encountered in 'spreading the TA gospel' (as the often-heard expression puts it), the PACITA project itself contributed to raising particular expectations, i.e. that it is possible to produce generic knowledge that is valid and useful across all the partaking countries. For example, with a view to creating

a European platform of expertise in TA, one task led to the establishment of a TA portal[16] aimed at aggregating an online repertoire of TA experts, projects, publications and other resources for use by the international TA and policy-making communities.

Furthermore, the way transnational project collaborations were conducted contributed to the disembedding and standardization of participatory TA formats. In two of the PACITA cross-European projects (the scenario workshop on ageing society and telecare [Barland, Delvenne, and Rosskamp 2016], and the European Wide Views on sustainable consumption [Jørgensen, Kozarev, and Juul 2016]), local peculiarities were considered in an *ad-hoc* fashion and did not fundamentally challenge the common problem framing.[17] In the design of these cross-European participatory exercises, only surveyed citizens' opinions or stakeholders' visions were expected to vary from one country to the other. However, this context sensitivity was designed distantly in time and space from the common pre-established problem framing and standardized methodological approach.

Rather than making the case for national-specific models of new PTA units, PACITA partners gradually promoted generic and 'universal' TA knowledge, which is standardized and increasingly able to travel and be taken up in various decision-making arenas. One statement in the TA manifesto reads: *'TA can through strong knowledge sharing and collaboration contribute to knowledge exchange and synergies, which provide for widespread use of the independent and knowledge-based advice from TA. Countries should help each other by sharing TA knowledge and outcomes* (Klüver, Nielsen, and Jørgensen 2016a, 15). Hennen, Nierling, and Judit Mosoni-Fried (2016) share the same idea, even if they express it in slightly different terms: '*To further promote TA, one viable pathway would be continued collaboration – for example, through starting TA projects together with experienced TA countries*' (Hennen, Nierling, and Judit Mosoni-Fried 2016, 38). Despite its innocuous appeal, this proposal can lead to strong political tensions, for instance when assessing sensitive technologies. It means that countries with no experience in TA would be left with little agency to negotiate the terms, relevance, framing, problem definition, methodology, and to appropriately discuss the implications of the results of specific collaborations with experienced TA partners.

Conflicts with established civic epistemologies at the national levels

In the civic epistemology of the Czech Republic, the perception of future-oriented knowledge suffers from a bad reputation inherited from the socialist period, as it is associated with central state planning. According to the interviewees, this perception still ambiguously connotes forward-looking practices, including TA. Moreover, instead of the parliament being the privileged recipient of TA knowledge, as the PACITA narrative predicted, in the Czech Republic a greater impact on STI policy is expected if the TA institution is directly and solely responsible to the government. Quite pragmatically, as a Czech project manager put it: '*We have to do it our own way, what we usually do and what we are good at: write reports, papers, strategies, sometimes lobby a bit. But usually we don't get involved with the Parliament*'. This quote summarizes the situation and perspectives in the Czech Republic, which served as a backdrop for the local non-PTA partner to consider the uptake of TA in its portfolio of activities. In this context, members of the same organization admitted to frequently encountering problems in engaging parliamentarians in TA-

related activities, as PACITA advocated. As an executive explained: '*We've had huge debates here. We were struggling with the PACITA focus on parliament. Not because it's irrelevant but there is no effective collaboration. It's difficult to approach the Parliament. Thanks to PACITA we build some contacts and collaboration activities with MPs or senators. But the approach of MPs listening to [us] is not satisfactory […] They say they are interested but nothing happens. It's a long-term challenge with short-term politicians. It's easier to work with the Ministries*'.

Instead of institutionalizing a function of 'political knowledge brokering' (PACITA Part B: 46) with Parliament and civil society as key actors, as envisaged by PACITA, the Czech partner saw itself in a role of '*intermediator among different government bodies*' and other innovation stakeholders, as a service to businesses (Hebakova et al. 2016, 58). This is probably not the preferred strategy of established TA practitioners. Hennen and Nierling (2013:, 47) agree that, in such a scenario, '*the best chances, if any, to build up a TA institution are for TA being integrated into already existing institutions which act at the governmental level with responsibilities in monitoring and evaluation of S&T*'. Finally, foreign epistemic practices of participatory TA activities including citizens were considered inspiring but difficult in the Czech context, where despite the activities undertaken in the framework of PACITA, it remained difficult to invite citizens to participate in the production of TA knowledge for free. As a project manager put it: '*We try to increase people's involvement in STI issues. But it will most probably not be like the Danes' people involvement.*'[18]

Likewise, in Portugal, a country ruled by a dictatorship hostile to science until the 1970s, civil society has little experience with citizen participation in STI, and the politicians we spoke to did not indicate that a change was expected in this area. Since the democratic transition, and especially since the mid-1990s, when J. M. Gago became the first dedicated Minister for Science and Technology, the predominant style of science policy can be characterized as '*policy-for-science and not science-for-policy*' (Almeida 2012, 228). The governance of STI has been described as '*science-oriented or science-led science policy, defining a limited number of stakeholders, [which] has as its underside the underdevelopment of science for policy, particularly in areas associated with (or likely to generate) public controversy*.' (Hagendijk et al. 2005, 60).

Several interviewees from academia and policy-making emphasized that Gago strongly believed that science policy should be an exclusive prerogative of the executive branch. He was therefore reluctant to transfer powers to Parliament in these areas. As a result, MPs in Portugal gradually sought to rebalance access to expertise unequally distributed in favor of the executive branch. Such a development resonated with the surge of pride that led members of the U.S. Congress to decide to institutionalize the OTA, but there it is not part of an effort to maintain competitiveness and global leadership in science and innovation, but rather to facilitate and organize the democratic transition in STI policy. These efforts culminated in 2009, when the Standing Committee for Education, Science and Culture (CECC) published a 'Report on Science' which examined the role of national R&D structures for economic and social growth. This report gave rise to a parliamentary resolution (60/2009) entitled 'Deepening the activities of the Assembly of the Republic in the fields of science and technology'. It suggested the establishment of an institutional platform for meetings between politicians and scientists in order to provide the MPs with anticipatory knowledge to support public policies. It also requested a

feasibility study on the establishment of a PTA. However, the discussion of establishing (and funding) a TA capacity in Parliament has been overshadowed by more pressing issues, notably dealing with the consequences of the 2008 economic crisis, which made the TA concept '*a hard sell to constituents*,' as one MP told us. Another key MP to this process explained to us that as a result '*[in Portugal] we are lagging behind from the point of view of other countries*', a view that was also reflected in the minutes of the parliamentary hearings to which we had access, where almost all the experts mentioned the need to join EPTA in order to benefit from the 'best practices' of other countries.

Interviewees in Portugal often mentioned '*the context of global competitiveness and the threat of emerging powers*' for the Portuguese economy. This threatening environment fuels the tendency to institutional isomorphism (Di Maggio and Powell 1983), i.e. following foreign trends in STI policy in the name of greater efficiency, which automatically puts Portugal in a 'deficit' position with a lot of 'catching up' to do compared to other European countries, and especially the so-called 'PTA countries'. When naturalized and even internalized by the actors, whether PTA or non-PTA countries, these 'isomorphic pressures' prevent 'isomorphic differences' from being opened up to larger analytical and empirical scrutiny (Irwin, Vedel, and Vikkelsø 2021).

The lowest common denominator: at least 'frugal' TA[19] based on foreign imports of TA knowledge

During our fieldwork conducted in Portugal and the Czech Republic, we found strong expectations of imports of foreign TA knowledge for national policy making. In Portugal, for example, the context of adverse economic conditions and austerity politics justified the search for alternative avenues for TA, in particular low-cost solutions to nevertheless provide parliamentarians with some TA knowledge. In 2013, a dedicated parliamentary committee reflecting on national prospects for TA concluded that it would be necessary to set up a digital library for TA, 'an instrument that would only require minimum funding and could build on partnerships and synergies' (Santos 2013). Content-wise, the library would constitute a historic repository of pertinent experiences and policy-oriented work carried out in other countries as well as academic publications relevant for TA, recent foresight studies and documents on the consequences of technology transfers. Hence it would be a source of inspiration and guidance for parliamentarians. Rather than a 'glass and concrete TA organization' (Ely, Van Zwanenberg, and Stirling 2014) as initially envisioned by the PACITA partners, as a tentative solution (which is still not a reality in July 2021), the digital library would have been the only permanent organization with minimal and uncertain staff and a coordination and support board that only meets sporadically.

The library idea conveys a universal conception of TA knowledge, as non-contextual, transportable, and adaptable between countries. Under this conception, the framing conditions and original context-related research questions are not reflected upon. The main idea is to profit from work being done elsewhere to save costs, sometimes based on the justification that some technological developments are taking place over and above national borders.

Yet Portuguese actors also expressed the need to go beyond compilations of TA knowledge produced by established TA units: by appealing to 'TA-like' research

(originating from backgrounds as diverse as STS, foresight, evaluation, innovation economics, technology management and transfer, etc.), the library idea shows little sensitivity to context sensitive problem-framing, or even the TA labeling of such knowledge (and perhaps more importantly, the theoretical and methodological peculiarities of this community of practice). While there is perfect awareness that such documents were not originally designed or tailored for Portuguese members of the national Parliament, it reads as if no additional efforts would be required to render this information useful to the MPs, as if it could be understood directly and subsequently used for policy discourse or to legislate.

Another example illustrating the discursive shift from institutional to knowledge deficit comes from some partners' discourses in the Czech Republic (and Central-Eastern European countries more broadly), with their characterization of TA as 'an eye opener' and 'knowledge sharer' (Hebakova et al. 2016, 62). The role of TA as 'knowledge sharer' is envisioned as follows: '*There will always be a constant need for various examples of how one or another issue is solved in other countries. If Germany, Austria, the Netherlands or some other TA country can afford large-scale research on the impact of technologies developed in their countries on society in general – in the case of Eastern European countries and their budgetary constraints and undeveloped R&D systems – then adapting already existing EU knowledge into the local context might be a more feasible solution. That's why cross-European cooperation of TA-like institutions is so important.*' (Hebakova et al. 2016, 62).

In such a view, more equivalences are being created between TA and other knowledge sources (such as foresight, evaluation, policy analysis, STS) and between foreign and national sources of TA knowledge. Such foreign knowledge can *ad minima* be an inspiration or learning experience and *ad maxima* a quick and cheap way to locate 'knowledge' upon which policy-making can be based and avoid so-called unnecessary duplication of TA work.

In order to reap the benefits of enhanced standardization, international networks are particularly valued for knowledge exchanges. EPTA membership is considered to be of critical importance, as attested by Portugal becoming an Associate member of EPTA in 2017 (after a failed attempt in 2016), one year after Wallonia was granted the same status. Other PACITA partners less advanced along the path of institutionalization, such as Hungary, the Czech Republic, Lithuania or Bulgaria, successfully applied for observer status in the EPTA network. More recently, a global TA network was created, with the objective '*to transcend the existing, mainly national, tools and approaches towards opportunities for collaborations and networked solutions*'. It also aims '*to facilitate the exchange of know-how and codification of principles of good practice, but also to serve as an incubator of future global cooperation through an array of networked organizations that can exchange information and collaborate on issues of joint interest*'.[20]

Discussion: the rise of an asymmetrical form of cosmopolitan epistemic subsidiarity and its consequences

As the PACITA project went on, the partners were tempted to temporarily abandon the normative imperative of expanding the landscape of TA institutions, and instead address a deficit articulated in terms of knowledge gaps, rather than institutional gaps. Although

the partners' strategy was imbued with cosmopolitan intentions, we identify this shifting deficit as co-produced with an asymmetrical form of cosmopolitan epistemic subsidiarity. Once rendered explicit, issues of cosmopolitan epistemic subsidiarity open up a series of research avenues, not only for the European and international TA community, but also for analyzing the power asymmetries in the more traditional and institutional conceptions of subsidiarity.

Firstly, we wish to dig deeper into the issue of cosmopolitan subsidiarity and see what kind of unforeseen challenges it poses for power relations. We also ask how a cosmopolitan subsidiarity of knowledge can be envisioned that would nonetheless respect, rather than transcend, different civic epistemologies. In the case of PACITA, although tremendous efforts were dedicated to pretend that TA knowledge may be equally valid and useful across all the European countries, regardless of a persistent institutional deficit, the distribution of roles and power remained very uneven. Instead of being an inspiration or blueprint for creating institutions, as the cookbook metaphor implied, existing TA organizations become knowledge providers for smaller or less experienced actors in countries where such capacities do not exist.

During the course of the project, several non-PTA partners complained and resisted the classification and practices imposed on them by the PTA partners. To reduce the conflict, the latter agreed to reward non-PTA countries with a slightly attenuated description of their deficit, acknowledging that they had become 'emerging TA countries', and could be recognized as carrying out 'TA-like activities'. Intended to be less polarized, such a narrative continued to represent and compare all European countries based on their state of advancement in TA practice and expertise. The idea that some countries suffer from a deficit and have some 'catching up' to do becomes even more entrenched, which naturalizes hierarchies and describes as retrograde everything that is asymmetrical with respect to what is declared advanced (de Sousa Santos 2012). '*We cannot remain on the sidelines of this [TA] movement that is developing throughout Europe. It is a sign of political incapacity*', as a Portuguese MP put it. Thus, deficits do political work by indicating how different civic epistemologies are treated asymmetrically. This relationship is expressed in terms of subsidiarity, which in the case of PACITA not only made the coexistence mode almost impossible, it also installed a very unequal cosmopolitan order since the epistemic standardization of TA practices left little or no room for alternative epistemologies and local reconfigurations.

In these cases where power differentials are underestimated, cosmopolitanism cannot keep its promises and equivalences are hardly possible. Indeed, when cosmopolitanism takes this guise, this mode of epistemic subsidiarity enshrines the epistemic supremacy of the most powerful actors and requires less powerful actors to import and adopt foreign practices and knowledge. Power must here be understood in relational terms and should not be treated as inherently bad or oppressive, but as essentially part of human interactions in a collaborative research project. According to this conception, '*the exercise of power consists in guiding the possibility of conduct and in ordering the possible outcome. To govern, in this sense, is to structure the possible field of action of others*' (Foucault 1982, 790). From conception to completion of the PACITA project, the actors who exercised the most power were from the beginning, and have remained, the PTA partners. They were the ones who were primarily involved in writing the project proposal, and they were subsequently in charge of leading all the substantial work packages as

well as of the training of the non-PTA partners (e.g. in the summer schools and practitioners' trainings). For obvious reasons, it was also their institutions that served as blueprints to 'documenting TA'. In addition, they were also responsible for shadowing their 'less experienced' partners by being 'paired' with them in the work package dedicated to expanding the TA landscape. Finally, it was the PTA partners who were tasked with coordinating the methodologies and the implementation of the major cross-European participatory events.

Yet it is too simplistic to consider that the non-PTA partners were simply dominated by their more powerful counterparts. What we identified is, first, a division of labor in which some actors standardized a set of norms (e.g. problem framing, research design, methodology, analysis grid, report structures, communication strategy) that were adopted by all PACITA partners. The latter then produced knowledge locally, which was then aggregated to also exist in a 'European' form from which additional policy recommendations were made. Second, we have shown a more obvious pattern, which is the fully consented and desired import and adaptation of knowledge produced by more resourceful actors by those who suffer comparatively from a TA knowledge deficit and can make do with a 'frugal TA'. The narrative of a TA knowledge deficit was thus a *collective* achievement that was successful enough to reduce or silence any alternative. This situation can be characterized as 'narrative salience' (Claisse and Delvenne 2017), that is, when a narrative is so dominant that there appears to be no serious counter-narrative anymore. '*Paradoxically, salient narratives can lead to a sense of powerlessness even among its promoters and beneficiaries*' (Claisse and Delvenne 2017, 260). These collective commitments to certain ideas or ways of knowing, such as framing the TA deficit in knowledge terms rather than in institutional terms, were not, however, just achieved through free and unconstrained adherence. Epistemic subsidiarity implies that power is exercised (intentionally or unintentionally) by the prevalence of certain knowledge practices over others, which always already delimit the field of action and reduce the scope of possibilities. The epistemic standards of TA practices were enculturated in the countries of the most powerful actors, and they ended up by delegitimizing and dominating the cultures and practices of the epistemic communities they actually intended to support.

The project to solve the deficit of TA institutions in Europe was not rooted in the omnipotence of PTA institutions, whose merits would be obvious to decision makers expecting evidence-based policy making. The reality experienced by members of the TA community is quite different. For a quarter of a century, it has been marked by the trauma of the elimination of several TA institutions. The demise of the American Office of Technology Assessment (OTA) is a well-documented emblematic case.[21] But during the PACITA project, the consortium also had to survive the abolition in 2011 of the Flemish PTA[22], and at the same time face the political attacks that nearly eliminated the project coordinator, the Danish Board of Technology, removing its formal link with the Danish Parliament. Therefore, the shift to a knowledge deficit co-produced with an asymmetric form of cosmopolitan epistemic subsidiarity is a fragile survival strategy that risks undermining the results that the TA community has a right to expect from 'true' cosmopolitanism. In a sense, TA is caught between a rock and a hard place, by being threatened in certain places, while at the same time seeking to persist by contributing to a European, and even global, agenda.

Underlining this possible downfall of cosmopolitanism should in no way be interpreted as a call for a return to coexistence as a path of epistemic sovereignty (or to put it more bluntly, phobia of foreign knowledge). On the contrary, we want to raise awareness of the asymmetries of power that remain in the cosmopolitan order, and of the fact that the standardization of norms of knowledge can threaten the diversity of perspectives, as this is an important springboard for the effectiveness and legitimacy of public decision making.

Conclusion

In this paper our goal was to contribute to ongoing debates in STS and innovation studies about how STI discourses and practices today circulate across diverse socio-political contexts. We researched how and to what extent TA approaches could spread across various national contexts outside the core of European TA, Western Europe, while considering the specificities of the receiving environments, in Southern and Eastern Europe. As an empirical reference point, we studied an FP7-funded project, PACITA, which developed as a set of activities aimed at addressing the deficit of TA institutions in Europe. In this framework, the pursuit of TA institutionalization was subsumed under the banner of a common agenda and standardized toolbox for documenting, debating and doing TA.

Our analysis showed that over the course of the PACITA project, partners gradually abandoned the normative agenda of expanding the landscape of TA institutions, and instead invested in a deficit narrative articulated in terms of a knowledge deficit. This process took place in a context of budgetary austerity in which TA was again (threatened to be) de-institutionalized in Flanders and Denmark. Beyond the contextual factors, it is important to consider the central role that 'projects', especially those funded by European framework programs, acquired over the years for European TA collaborations. As the salient form of engagement and cooperation in TA networks organization today, 'project' is a concept that reveals a productive polysemy: it refers the idea of a (shared) endeavor, a plan, something to commonly strive for (like the project of installing a TA institution in each country) while at the same time it crystalizes a temporary organizational form defined by limited time-horizon and allocated resources. As a result, the ambition to push out the horizon of the TA landscape is always already limited by the project form of doing TA that has become a sort of permanent status. TA is thus not only conceived as, it is also heavily dependent on, an accumulation of ever-renewing projects.

In the case of PACITA, it meant that the window of opportunity to stick to the original plan, a normative imperative underlying a deficit of TA institutions, was very limited in time because the European TA collaboration is so dependent on the project's form. The expansion of the TA landscape, the emblematic goal pursued by PACITA partners, because of its lack of immediate success, was thus overshadowed and subsumed under the hope of a hypothetical 'PACITA 2' which never saw the light of day. In other words, it seems that collaborations in the form of 'projects' have a structuring effect on the politics of addressing the deficit of TA in Europe.

Finally, with the benefit of time since the end of the PACITA project, we can step back and reflect not just on why a follow-up to PACITA was never funded, but also on the kinds of new European projects that have emerged. Many of them have one thing in

common: they are no longer about TA but about a more recent approach, at the heart of this journal's scientific concerns, responsible research and innovation. This evolution was certainly already present in the background of PACITA. As soon as the project was launched in May 2011, we were struck by the opening keynote of the European Commission's project officer, who came to Copenhagen for the occasion. Instead of speaking to us about what was planned to be done in the project, he kept telling us that we needed to integrate the way forward and think of TA in terms of RRI – terms that were totally absent from the initial PACITA proposal. Four years after that, the above-mentioned TA manifesto, released at the end of PACITA, ended on the following note, which exuded anxiety about an uncertain future:

> 'Responsible Research and Innovation has shaped the last year's policy discourse in Europe related to the societal role of research and innovation. It has given key concepts in TA, such as participation, forward-thinking, reflexivity and policy action, greater focus. TA can and should be a key carrier of the concept and play a light-house role in RRI.' (PACITA manifesto)

However, it seems that responsible innovation does not need TA to play such a light-house role. A number of other European projects have indeed been launched on RRI since then, such as the implementation of a monitoring system for RRI in Europe (i.e. MoRRI) or the production of RRI indicators or tools for research organizations and programs (i.e. RRI Practice or RRI Tools), mostly without the participation of most of the PACITA partners. Despite the possible overlap between the two approaches, TA and RRI are not interchangeable concepts; they do not relate to the same epistemic practices; they are not intended for the same audiences; and, most importantly, they do not encompass the same vision of a desirable future for STI policy-making. In a short essay published in this journal, Delvenne (2017) warned that '*under the spell of RRI, TA risks being reduced to a role of mere provider of ex-ante impact assessments*' (Delvenne 2017, 284). He quoted Von Schomberg (2011), the most visible originator of this concept at the EU level, who does not make any mystery of the future he envisions for TA: '*In the context of European policy making, Technology Assessments, ideally, have to merge with other types of impact assessments, as the success of major public policies increasingly depend on the anticipated impacts or the selected scientific and technological options*'.

The deeper issue is that this shift from TA to RRI tends to undermine the added value of TA knowledge, compared to foresight or other strategic intelligence bodies called upon to foresee and legitimate the possible outcomes of planned innovation activities. By putting themselves in the position of a(nother) champion of RRI, the TA community risk sawing off the branch on which they are sitting. Ironically enough, they participate to the creation equivalences that undermine the uniqueness of their epistemic practices in relation to other communities of practice that are not concerned with civic values of democratizing technologies and policy-making processes.[23] As a result, the civic epistemology identified at the European level and associated with TA may change permanently, and it will be up to future research to determine whether this changes the relationships with other civic epistemologies at the national level, and how these relationships translate and are expressed in terms of subsidiarity.[24]

At the theoretical level, this article started with what happens when we face problems of coordination between civic epistemologies at different levels and then analyzed PACITA's unfolding in terms of 'epistemic subsidiarity' (Jasanoff 2013, 2014), an analytical perspective that remains a blind spot in TA practice and scholarship. Although cosmopolitan TA appeals to ambitious goals, such as democratization or deepening convergence and harmonization, PACITA produced mixed results. First, cosmopolitan epistemic subsidiarity resulted from, and reflected, weakened ambitions and the heightened awareness of the failed attempt to remain entrenched in a coexistence mode of subsidiarity. Second, instead of giving due respect to the different civic epistemologies and ways of public reasoning, the promotion of 'universal' TA knowledge installed an asymmetric mode of cosmopolitanism.

At least three important conclusions can be drawn. First, TA practitioners and researchers should accept and openly talk about power asymmetries. Second, as TA (re-)makes community, the idea of engaging newcomers should be taken seriously as a political process — not as something that fixes a universalist approach to TA, but as something that itself is locally situated, co-produced, and that requires an elaborate and outspoken political and epistemic subsidiarity regime. Third, whereas the construction of 'deficits' with regard to science and technology has been a target of STS critique for several decades (Wynne 2006; Pfotenhauer, Juhl, and Aarden 2019; Frahm, Doezema, and Pfotenhauer 2021), the construction of a deficit in the PACITA project vehicled normative dimensions that, at least *a priori*, many STS scholars would probably endorse. However, without due attention, the reflection about TA is at risk of being trapped in a vision whereby standard TA approaches, for instance some 'participatory' forms of TA, are mastered by a transnational space of experts who project their epistemic authority onto local contexts, leaving little room for situated reconfigurations, *ad hoc* refinements and 'reflexive engagements' (Voß and Amelung 2016). While the benefits of transferring best practices to the international TA community, for example for coordination and professionalization purposes, should not be overlooked, it is important to carefully disentangle the normative dimensions and the inequalities of power that accompany the enthusiasm for transnationally applicable TA practices.

Notes

1. See the EPTA website: http://www.eptanetwork.org/
2. These European projects include EUROpTA (European Participatory Technology Assessment, 1998–1999), TAMI (Technology Assessment: Methods and Impacts, 2002–2003) or PACITA (Parliaments and Civil Society in Technology Assessment, 2011–2015).
3. TA knowledge can be defined as knowledge produced to provide and support robust knowledge-based policy-making on societal topics related to science, technology and innovation (Klüver et al. 2016, 14).
4. See the project's website: www.pacitaproject.eu.
5. PTA offices that are very much integrated within parliaments, such as the French OPECST, the British POST or the European Parliament's STOA, cannot participate in a project funded by the European Commission for reasons of separation of powers.
6. With this we do not want to say that PACITA has eclipsed or replaced EPTA, certainly not, but rather to support the idea that there was a convergence of project, resource and opinion

strong enough to organize in the framework of PACITA activities traditionally devolved to EPTA and reserved to its members.

7. '*The first meeting of the European TA community under the label of 'European Congresses of Technology Assessment' dates back to October 1982 when the Ministry of the Interior of the Federal Republic of Germany hosted a conference in Bonn that attracted some 60 experts from eleven countries – among them were representatives of the US Office of Technology Assessment. Congresses on TA later held in Amsterdam (1987), Milan (1990) and Copenhagen (1992) contributed significantly to the conceptualization, philosophy as well as institutionalization of TA*' (Scherz et al. 2016, 142).
8. The revived tradition of organizing European TA conferences continued after PACITA, with a third (counting the two organized by PACITA) conference in Cork in 2017 and a fourth in Bratislava in 2019, at which the global TA network was launched. A fifth one is planned in Karlsruhe in 2022.
9. '*Unlike the participant observer, who tends to invent a new and somewhat transient role as a hang around, the observant participator is more likely to occupy and enact a preexisting role in the field. There are also important differences in passivity and proximity. Compared to participant observers, observant participators embrace a more active role in the field as they seek to minimize the distance between themselves and their empirical object*' (Seim 2021, 3).
10. Four practitioners' trainings (in Lisbon in September 2012 on 'selecting the TA issue', in Sofia in April 2013 on 'selecting the TA method', in Vilnius in November 2013 on 'involving actors in TA', in Prague in September 2014 on 'TA communication and impact strategies') and two summer schools: one in Liège in June 2012 on 'renewable energy systems and the role and use of PTA', one in Cork in June 2014 on 'the role of technology in the challenges and opportunities of the ageing society'.
11. At least two epistemological positions can be argued about the extent to which the researcher should be bound to the field. '*There has been a long running discussion within the social sciences and humanities on how researchers engage with their fields of study and what this brings about. While some researchers argue that by engaging and being too close to the studied field, the researcher is compromising 'objective' or 'neutral' positions; others warn that by being too distant the researcher fails to understand or improve problematic or unethical conditions*' (Lydahl and Nickelsen 2022). The epistemological position of 'careful engagement' makes it possible to overcome this dichotomy by using the generativity of the embedded researcher position.
12. We have chosen to focus on these two modes of epistemic subsidiarity because they are derived from empirical observations that we have analyzed and which we discuss below. Further empirical work may uncover new regimes or modes of epistemic subsidiarity for TA. Jasanoff also mentions 'constitutionalism' as a third mode, which consists in defining a common general framework that transcends local differences and defines the reciprocities between different polities. It is important to note that these three modes are not intended to be exhaustive.
13. Equivalences are social practices that classify and establish what is like and unlike and accordingly, how it ought to be treated. Equivalences are necessary for rendering assessments and scientific results more generally 'freely transportable across political boundaries' (Jasanoff 2013, 139).
14. The World or Europe Wide Views method has been used at the European and global levels to organize citizen consultations on various policy issues (www.wwviews.org). See also Jorgensen et al. 2016; Jorgensen and Juul 2015; and Delvenne and Macq 2020 for a critical analysis.
15. Initially, the parliamentary aspect was essential for the PACITA partners (hence the P for Parliament in the project acronym), but as the non-PTA partners informed all partners of their respective contexts, it became apparent that in most Central and Eastern European countries, lobbying to establish a new institution in a parliament, which is relatively weaker and seen as less central than the government, made little sense and gained no traction. Therefore, the project partners decided to allow themselves some semantic flexibility and

to speak of 'policy-oriented' TA instead of 'parliamentary' TA, while continuing to insist on the importance of organizing some kind of formal link with parliament. While this compromise might at first glance seem anecdotal, it turned out that the loss of centrality of the parliamentary character became an outcome of PACITA. Thus, the book published at the end of the project, co-edited by the coordinator and his team and reporting on the main results obtained, was entitled: *Policy-Oriented Technology Assessment across Europe. Expanded Capacities* (Klüver, Nielsen, and Jørgensen 2016a).

16. http://technology-assessment.info/
17. Local organizers of these transnational participation exercises could hold additional panels on issues deemed of national interest, but only as a complement. However, the relevance, problematization and results of these national add-ons have not been discussed or reflected upon in PACITA. Until the last moment, it was also possible for third-party countries and/or organizations to take part in the exercise and organize a national workshop themselves, as the preparation material and methodology was designed to be easily scalable and replicable.
18. Even if citizen participation is not yet a widespread conviction in the EU, as the promoters of European civic epistemology concede, '*such [an] assumption [is] necessary to justify an increased role for ordinary citizens in science-in-society [as] it may become a component of a European model, and reinforce the quest for a European political and cultural identity.*' (MASIS Report, Siune 2009, 65)
19. This term is inspired by the notion of 'frugal innovation' (Radjou and Prabhu 2015), often associated with developing countries, which refers to the idea that companies can develop high-quality products and create more value with limited resources. Applied to TA, frugality suggests that it would be possible to do TA without dedicated institutions, in a context of resource scarcity and uneven public spending on knowledge-based policy-making across Europe.
20. https://globalta.technology-assessment.info/images/docs/globalTA_Mission-Statement.pdf
21. See for example the special issue of *Technological Forecasting and Social Change* edited by Bimber and Guston (1997).
22. Delvenne and Parotte (2019) analyze that the closure of the Instituut Samenleving en Technologie (IST) bears striking similarities with the OTA story.
23. These developments follow a very relevant question from an anonymous reviewer, whom we thank by the way, asking whether PACITA's critiques could be used as a basis for recommendations to achieve 'better designed projects'. If 'better designed' means a greater chance of being funded by the European Commission, then riding the RRI wave until it subsides, with less emphasis on what constitutes the roots of the TA ethos, is probably a safe strategy in an era of scarce public resources. The reader will have understood that we have a more political reading of the question, and that it seems to us that the price to pay to have TA practices eclipsed by the RRI approach is much too high. Rather than focusing on micro-interventions for fine-tuning projects, in a time of political uncertainty and epistemic ambiguity, we believe that TA communities should become a bastion of democratic politics (cf. Delvenne and Parotte 2019) – and it seems that there is not much room democratic politics in RRI frameworks, which '*largely ignore questions about the politics in and of deliberation, the authoritative allocation of values, and the institutional uptake of deliberative engagements*' (Van Oudheusden 2014, 67). Conversely, in the TA communities, several recent initiatives show that the politics and normativities of TA are at the heart of current debates: for example, the Austrian ITA recently finalized two projects on these issues: in March 2018 one titled '*Practices and Paradigms of Policy Advice in TA*' and in December 2019 another titled '*TA and Normativity*'; and TATuP, the *Journal for Technology Assessment in Theory and Practice*, dedicated a special issue on '*Normativity in TA*' in 2019.
24. Frahm, Doezema, and Pfotenhauer (2021, 29–31) recently argued that international organizations such as the OECD and the European Commission invest the language of politics and democracy in a particular way, by framing a lack of societal engagement in innovation governance as a major barrier to the uptake and dissemination of new technologies and

simultaneously presenting RRI as the solution to relocate democratization within their own transnational expertise, commitment to economic growth and market liberal political agenda. We are concerned that, according to their analysis, RRI becomes a vehicle for shifting democratic sovereignty away from the nation-state and demanding that locally grounded forms of reasoning about science and technology as objects of political consideration become primarily addressed in international arenas, which are characterized by their lack of democratic legitimacy.

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References

Almeida, Mara. 2012. "Explorative Country Study: Portugal." In *Expanding the TA Landscape. Country Studies*, edited by Leonhard Hennen, and Linda Nierling, PACITA Project, Deliverable 4.1, European Commission, 249–283. Brussels: European Commission.

Barland, Marianne, Pierre Delvenne, and Benedikt Rosskamp. 2016. "The Future of Ageing—Stakeholder Involvement on the Future of Care." In *Policy-Oriented Technology Assessment Across Europe: Expanding Capacities*, edited by Lars Klüver, Rasmus Ø. Nielsen, and Marie-Louise Jørgensen, 105–113. London: Palgrave Macmillan.

Bimber, Bruce, and David H. Guston. 1997. "Introduction: The end of OTA and the Future of Technology Assessment." *Technological Forecasting and Social Change* 54 (2–3): 125–130.

Böhle, Knud, and António Moniz. 2015. "No Countries for old Technology Assessment? Sketching the Efforts and Opportunities to Establish Parliamentary TA in Spain and Portugal." *Technikfolgenabschätzung–Theorie und Praxis* 24 (1): 29–44.

Braun, Virginia, and Victoria Clarke. 2006. "Using Thematic Analysis in Psychology." *Qualitative Research in Psychology* 3 (2): 77–101.

Bütschi, Danielle, Simon Joss, and Michel Baeriswyl. 2002. "Switzerland: New Paths for Public Participation in a Direct Democracy." In *Participatory Technology Assessment. European Perspectives*, edited by Simon Joss, and Sergio Bellucci, 126–139. London: Centre for the Study of Democracy.

Claisse, Frédéric, and Pierre Delvenne. 2017. "As Above, so Below? Narrative Salience and Side Effects of National Innovation Systems." *Critical Policy Studies* 11 (3): 255–271.

Colliot-Thélène, Catherine. 2004. "Expliquer/Comprendre: Relecture D'une Controverse." *Espace Temps* 84 (1): 6–23.

Decker, Michael, and Ladikas, Miltos (eds.). 2004. *Bridges Between Science, Society and Policy*. Berlin: Springer.

Delvenne, Pierre. 2011. *Science, technologie et innovation sur le chemin de la réflexivité. Enjeux et dynamiques du Technology Assessment parlementaire*. Academia L'Harmattan: Louvain-La-Neuve.

Delvenne, Pierre. 2017. "Responsible Research and Innovation as a Travesty of Technology Assessment?" *Journal of Responsible Innovation* 4 (2): 278–288.

Delvenne, Pierre, and Hadrien Macq. 2020. ". "Breaking bad with the Participatory Turn? Accelerating Time and Intensifying Value in Participatory Experiments"." *Science as Culture* 29 (2): 245–268.

Delvenne, Pierre, and Céline Parotte. 2019. "Breaking the Myth of Neutrality: Technology Assessment has Politics, Technology Assessment as Politics." *Technological Forecasting and Social Change* 139: 64–72.

Delvenne, Pierre, and François Thoreau. 2012. "Beyond the 'Charmed Circle' of OECD: New Directions for Studies of National Innovation Systems." *Minerva* 50 (2): 205–219.

Delvenne, Pierre, and François Thoreau. 2017. "Dancing Without Listening to the Music: Learning from Some Failures of the 'National Innovation Systems' in Latin America." In *Research Handbook on Innovation Governance for Emerging Economies*, edited by Stefan Kuhlmann, and Gonzalo Ordóñez-Matamoros, 37–58. Cheltenham: Edward Elgar.

de Sousa Santos, Boaventura. 2012. "Public Sphere and Epistemologies of the South." *Africa Development* 37 (1): 43–67.

Di Maggio, Paul J., and Walter W. Powell. 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields." *American Sociological Review* 48 (2): 147–160.

Doezema, Tess, David Ludwig, Phil Macnaghten, Clare Shelley-Egan, and Ellen-Marie Forsberg. 2019. "Translation, Transduction, and Transformation: Expanding Practices of Responsibility Across Borders." *Journal of Responsible Innovation* 6 (3): 1–9.

Doganova, Liliana, and Brice Laurent. 2016. "Keeping Things Different: Coexistence Within European Markets for Cleantech and Biofuels." *Journal of Cultural Economy* 9 (2): 141–156.

Ely, Alan, Patrick Van Zwanenberg, and Andrew Stirling. 2014. "Broadening out and Opening up Technology Assessment: Approaches to Enhance International Development, Co-Ordination and Democratization." *Research Policy* 43 (3): 505–518.

Foucault, Michel. 1982. "The Subject and Power." *Critical Inquiry* 8 (4): 777–795.

Frahm, Nina, Tess Doezema, and Sebastian Pfotenhauer. 2021. "Fixing Technology with Society: The Coproduction of Democratic Deficits and Responsible Innovation at the OECD and the European Commission." *Science, Technology & Human Values*, 1–43. Online First.

Gottweis, Herbert. 1998. *Governing Molecules: The Discursive Politics of Genetic Engineering in Europe and the United States*. Cambridge: MIT press.

Haas, Peter M. 1992. "Introduction: Epistemic Communities and International Policy Coordination." *International Organization* 46 (1): 1–35.

Hagendijk, Rob, Peter Healey, Maja Horst, and Alan Irwin. 2005. *Science, Technology and Governance in Europe: Challenges of Public Engagement*. STAGE project, Final Report.

Hebakova, Lenka, Edgaras Leichteris, Katalin Fodor, and Ventseslav Kozarev. 2016. "Adopting TA in Central and Eastern Europe – An Organizational Perspective." In *Policy-Oriented Technology Assessment Across Europe: Expanding Capacities*, edited by Lars Klüver, Rasmus Ø. Nielsen, and Marie-Louise Jørgensen, 57–63. London: Palgrave Macmillan.

Hennen, Leonhard. 1999. "Participatory Technology Assessment. A Response to Technical Modernity?" *Science and Public Policy* 26 (5): 303–312.

Hennen, Leonhard, and Miltos Ladikas. 2009. ""Embedding Society in European Science and Technology Policy Advice"." In *Embedding Society in Science and Technology Policy – European and Chinese Perspectives*, edited by M. Ladikas, 39–63. Brussels: European Commission.

Hennen, Leonhard, and Linda Nierling. 2013. *Expanding the TA Landscape*. PACITA Project, Deliverable 4.1. Brussels: European Commission.

Hennen, Leonhard, and Linda Nierling. 2014. ". "A Next Wave of Technology Assessment? Barriers and Opportunities for Establishing TA in Seven European Countries"." *Science and Public Policy* 41 (3): 1–15.

Hennen, Leonhard, Linda Nierling, and J. Judit Mosoni-Fried. 2016. "Expanding the TA Landscape—Lessons from Seven European Countries." In *Policy-Oriented Technology Assessment Across Europe: Expanding Capacities*, edited by Lars Klüver, Rasmus Ø. Nielsen, and Marie-Louise Jørgensen, 37–56. London: Palgrave Macmillan UK.

Irwin, Alan, Jane Bjørn Vedel, and Signe Vikkelsø. 2021. "Isomorphic Difference: Familiarity and Distinctiveness in National Research and Innovation Policies." *Research Policy* 50 (4): 104220.

Jasanoff, Sheila. 2004. *States of Knowledge: The co-Production of Science and the Social Order*. London: Routledge.

Jasanoff, Sheila. 2005. *Designs on Nature. Science and Democracy in Europe and the United States*. Princeton, NJ: Princeton University Press.

Jasanoff, Sheila. 2011. "Cosmopolitan Knowledge: Climate Science and Global Civic Epistemology." In *The Oxford Handbook of Climate Change and Society*, edited by John S. Dryzek, Richard B. Norgaard, and David Schlosberg, 129–143. Oxford: Oxford University Press.

Jasanoff, Sheila. 2013. "Epistemic Subsidiarity–Coexistence, Cosmopolitanism, Constitutionalism." *European Journal of Risk Regulation* 4 (2): 133–141.

Jasanoff, Sheila. 2014. "Serviceable Truths: Science for Action in Law and Policy." *Texas Law Review* 93: 1723–1749.

Jorgensen, Marie-Louise, and Katrine Juul. 2015. *Europe Wide Views on Sustainable Consumption. From European Citizens to Policy-Makers*. PACITA Project. Brussels: European Commission. http://citizenconsultation.pacitaproject.eu.

Joss, Simon. 1998. *The Role of Participation in Institutionalised Technology Assessment. A Case Study of Consensus Conferences*. PhD thesis, London: Imperial College.

Joss, Simon, and Sergio Bellucci. 2002. *Participatory Technology Assessment - European Perspectives*. London: Centre for the Study of Democracy (CSD), University of Westminster.

Jørgensen, Marie-Louise, Ventseslav Kozarev, and Katrine Juul. 2016. "Europe Wide Views on Sustainable Consumption." In *Policy-Oriented Technology Assessment Across Europe: Expanding Capacities*, edited by Lars Klüver, Rasmus Ø. Nielsen, and Marie-Louise Jørgensen, 114–122. London: Palgrave Macmillan.

Jurgen Ganzevles and Rinie van Est. 2012. *TA Practices in Europe*. Deliverable 2.2. PACITA Project, European Commission. Brussels: European Commission.

Klüver, Lars, Rasmus Ø. Nielsen, and Marie-Louise Jørgensen. 2016a. *Policy-Oriented Technology Assessment Across Europe: Expanding Capacities*. London: Palgrave Macmillan.
Klüver, Lars, Rasmus Ø. Nielsen, and Marie-Louise Jørgensen. 2016b. "The TA Manifesto." In *Policy-Oriented Technology Assessment Across Europe: Expanding Capacities*, edited by Lars Klüver, Rasmus Ø. Nielsen, and Marie-Louise Jørgensen, 13–16. London: Palgrave Macmillan.
Lucivero, Federica, Pierre Delvenne, and Michiel Van Oudheusde. 2019. "Making the Invisible Visible." *TATuP* 28 (1): 21–26.
Lydahl, Doris, and Niels Christian M. Nickelsen. 2022. *Careful Engagements*. London: Springer.
Miller, Clark A. 2005. "New Civic Epistemologies of Quantification: Making Sense of Indicators of Local and Global Sustainability." *Science, Technology, & Human Values* 30 (3): 403–432.
Mironesco, Christine. 1997. *Un enjeu démocratique : le Technology Assessment*. Genève: Georg.
Pfotenhauer, Sebastian, and Sheila Jasanoff. 2017. "Panacea or Diagnosis? Imaginaries of Innovation and the 'MIT Model' in Three Political Cultures." *Social Studies of Science* 47 (6): 783–810.
Pfotenhauer, Sebastian, Joakim Juhl, and Erik Aarden. 2019. "Challenging the "Deficit Model" of Innovation: Framing Policy Issues Under the Innovation Imperative." *Research Policy* 48 (4): 895–904.
Radjou, Navi, and Jaideep Prabhu. 2015. "Frugal Innovation: How to do Better with Less". *The Economist*.
Rip, Arie. 2001. "Technology Assessment." In *International Encyclopedia of the Social & Behavioral Sciences, vol.23*, edited by Neil J. Smelser and Paul B. Baltes, 15512–15515. Oxford: Pergamon (Elsevier Science).
Rip, Arie. 2002. "Regional Innovation Systems and the Advent of Strategic Science." *The Journal of Technology Transfer* 27 (1): 123–131.
Robinson, Douglas. 2010. "Experiments in Interactions. Constructive Technology Assessment of Newly Emerging Nanotechnologies", PhD diss. University of Twente.
Santos, Rui. 2013. *Avaliação Tecnologica Parlamentar*. Relatório Final. Commissão de Educação, Ciência e Cultura. Lisboa: Assembleia da República.
Scherz, Constanze, Lenka Hebáková, Leonhard Hennen, Tomáš Michalek, Julia Hahn, and Stefanie B. Seitz. 2016. "Building Community – Or Why We Need an Ongoing Conference Platform for TA." In *Policy-Oriented Technology Assessment Across Europe: Expanding Capacities*, edited by Lars Klüver, Rasmus Ø. Nielsen, and Marie-Louise Jørgensen, 139–146. London: Palgrave Macmillan.
Seim, Josh. 2021. "Participant Observation, Observant Participation, and Hybrid Ethnography." *Sociological Methods & Research*, 1–32. Online First.
Siune, Karen, et al. 2009. *Challenging Futures of Science in Society. Emerging Trends and cutting-edge issues. The Masis Report*. European Commission, Directorate-General for Research.
van Eijndhoven, Josee. 1997. "Technology Assessment. Product or Process?" *Technological Forecasting and Social Change* 54 (2–3): 269–286.
van Oudheusden, Michiel, Nathan Charlier, Benedikt Rosskamp, and Pierre Delvenne. 2015. "Broadening, Deepening, and Governing Innovation: Flemish Technology Assessment in Historical and Socio-Political Perspective." *Research Policy* 44 (10): 1877–1886.
van Oudheusden, Michiel, and Brice Laurent. 2013. "Shifting and Deepening Engagements: Experimental Normativity in Public Participation in Science and Technology." *Science, Technology & Innovation Studies* 9 (1): 3–22.
Vig, Norman, and Herbert Paschen. 2000. *Parliaments and Technology*. New York: State University Press.
Von Schomberg, René. 2011. "Prospects for Technology Assessment in a Framework of Responsible Research and Innovation." In *Technikfolgen abschätzen lehren: Bildungspotenziale transdisziplinärer Methoden*, edited by Marc Dusseldorp, and Richard Beecroft, 39–61. Wiesbaden: Springer.
Voß, Jan-Peter, and Nina Amelung. 2016. "Innovating Public Participation Methods: Technoscientization and Reflexive Engagement." *Social Studies of Science* 46 (5): 749–772.

Wynne, Brian. 2006. "Public Engagement as a Means of Restoring Public Trust in Science - Hitting the Notes, but Missing the Music?" *Public Health Genomics* 9 (3): 211–220.
Yin, Robert K. 1994. *Case Study Research: Design and Methods (Second Edition)*. Newbury Park, CA: Sage Publications.