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ORIGINAL PAPER

National Ethics Advisory Bodies in the Emerging Landscape of Responsible Research and Innovation

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Abstract The article examines the role played by policy advice institutions in the governance of ethically controversial new and emerging science and technology in Europe. The empirical analysis, which aims to help close a gap in the literature, focuses on the evolution, role and functioning of national ethics advisory bodies (EABs) in Europe. EABs are expert bodies whose remit is to issue recommendations regarding ethical aspects of new and emerging science and technology. Negative experiences with the impacts of science and technology in the past have resulted in calls for increased transparency and broader participation and pluralism in expert advice and policy decision-making. Do national EABs function as inclusive, anticipatory "hybrid forums"? Or do they resemble more "classical" expert-oriented bodies, inspired by technocratic or decisionist approaches? As part of the empirical analysis of the role and functioning of institutional ethical advisory structures in 32 European countries, an extensive analysis of EAB websites and the content of publicly available documents on such institutions has been carried out, supplemented by an online survey of representatives of the EABs. One major finding of the empirical analysis is the very uneven distribution of "hybrid forum" features of EABs across Europe.

Keywords Bioethics · Emerging technologies · Europe · Policy advice · Public participation · Responsible research and innovation

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Introduction

Over the last decade, the European Union (EU) has increasingly presented itself as a community with shared moral values, as opposed to one based merely on trade and political ties. As part of this process, ethical issues relating to the scientific and technological advances achieved in recent years have been assigned high normative relevance in a specific way. It is widely believed that recent scientific and technological progress offers huge economic potential for Europe [19]. According to some experts and science managers at least, a plethora of future applications of great value to humankind may result from developments in such new and emerging fields as biotechnologies, nanotechnologies, information and communication technologies, neurotechnologies and cognitive science [67, 68]; cf. [61]. These applications, they claim, will cover practically all fields of human life. Nonetheless, unchecked advances in these new and emerging technologies may entail serious risks, not to mention considerable potential for negative social consequences [29, 61]. There is also the risk of

these technologies being "hyped" due to the related visions of the future [13, 62]. In the context of this ambivalent recent progress of science and technology, institutionalised and increasingly diversified policy advice on ethical issues of science and technology is apparently playing an ever more relevant role as a specific normative pillar of European research and development policy making.

This paper will analyse how the role and function of national ethics advisory bodies (EABs), such as national ethics committees, has changed over the last decades with the increased institutionalisation and diversification of policy advice on ethical issues in Europe. There is still relatively little knowledge about how EABs function, and the few empirical analyses that have been conducted so far are now some years old [1, 28]. At the same time, scholarly interest in these institutions and in "ethical policy advice" at large has recently increased [83]. Traditionally, institutions of policy advice have been conceived of as expert bodies providing factual information and knowledge to politicians who use this information and knowledge in turn to make the best possible decisions on the basis of objective expert knowledge. This positivist and technocratic point of view is no longer shared by many people. There is now broad consensus that the respective roles of experts, politicians, "stakeholders" and citizens should be seen differently and that there is huge potential for reorganising their interactions in ways that support not only an inclusive, early societal shaping of science and technology but also responsible research and innovation. In accordance with this trend, one may argue that national EABs should also be conceived of or designed as open and inclusive, anticipatory "hybrid forums", rather than as expert bodies whose work is insufficiently transparent. Using the terminology of "Mode 2" theories, one could say that there is thus a need to observe the new social role of ethical expert advice in the context of the development of "socially robust knowledge" [63]: 35. Such knowledge may help to balance innovation and precaution and to integrate questions of ethical relevance and societal acceptability and desirability into innovation processes on the basis of broad societal deliberation aimed at achieving consensus or partial agreements.

The main aim of this paper is thus to examine how EABs have evolved in recent decades, whether they incorporate features of inclusive anticipatory "hybrid forums", or whether they more resemble "classical" technocratic expert bodies that often serve merely to legitimise the decisions of policy makers. With this goal in mind, we selected and examined some parameters regarding EABs, such as their transparency and their use of participatory mechanisms. In the context of our empirical analysis, we attempted to examine the validity of the various opinions on the role and function of EABs. We reviewed whether national EABs in Europe have succeeded in addressing moral pluralism, in consulting various actors and stakeholders and in stimulating general public debate. In recent decades, these issues have emerged as crucial elements in the governance of ethically contentious developments in new and emerging science and technology.

The paper is structured as follows: in the first section, we focus on the main challenges for ethical expert advice in Europe. One crucial question is the role played by such expert advice today as compared to its role in the heyday of expertocratic and other expert-oriented approaches. In the second section, we outline the history of institutionalisation of ethical policy advice in Europe, focusing on national EABs in Europe which date back to the end of 1970s. In the empirical part of the study, which explores the recent role and functioning of EABs in a number of European countries, particularly EU member states, we initially summarise our methodological approach. We then present and discuss core results of our empirical investigation, which may help fill a gap in the literature on the role of ethical advice in public policymaking, specifically in the governance of ethically controversial emerging science and technology. In the paper's conclusion, we reflect on the role of expert-based policy advice on controversial emerging science and technology in the context of the new EU research and development (R&D) policy strategy of responsible research and innovation (RRI). This strategy focuses on transparent, participatory and responsive governance processes which make societal actors responsible to one another with respect to the ethical acceptability, sustainability and societal desirability of the progress of science and technology [80, 81]. At present, Europe finds itself confronted with a complex and challenging political and economic situation. The European *zeitgeist* has been strongly influenced by ideas that promote market orientation, deregulation and globalisation and by the corresponding neo-liberal economic concepts. On the other hand, structural societal challenges, such as those defined in R&D policy programmes as 'Grand Challenges', and the recent symptoms of a massive socioeconomic crisis are

likewise important elements in the context of current European R&D policies. The emerging RRI strategy is therefore evolving in a situation of heightened uncertainty which at the same time represents a core feature of any attempt to govern new and emerging science and technology.

Against this background, warnings such as those already expressed a couple of decades ago by Hans Jonas [43] deserve to be reconsidered, in particular with a view to the balance between innovation and the question of the societal goals of innovation on the one hand and precaution and a responsible handling of uncertainty and risks on the other. Jonas had argued for a broad use of the precautionary principle as a means of promoting responsibility for future generations and the environment by dealing with existing and potential threats resulting from uncontrolled scientific and technological development. According to him, there is a need to make a transition from *ex post* responsibility, i.e. the "responsibility of guilty persons", to *ex ante* "responsibility of stewardship" [43]: 230. In light of this idea, the EU RRI strategy would need to insist that researchers and other groups of stakeholders not only gear their activities towards economic benefits, but also ascertain whether new and emerging technologies will be socially and humanly desirable. According to European democratic ideals and values, one crucial question is also how these technologies are viewed by the European people, while their social and public acceptance is a decisive factor in innovation processes. Against this background, it is evident that the emerging RRI strategy, which is oriented towards a transparent and participatory process involving mutually responsible societal actors of innovation and aims to ensure the ethical acceptability, sustainability and societal desirability of the innovation process and its marketable products, needs to base the choices between innovation scenarios not only on scientific and other expert-based information and knowledge or on cost-benefit calculations, but also on the notion of a broad societal responsibility of all involved stakeholders.

The Current Challenges of Ethical Expert Advice in Europe

Expert advice made available to policy and other decision makers has played a very important role in modern societies for quite some time now. An expert advisor can be defined as someone with recognised and, usually, certified competencies in dealing with the challenges and problems in question, who uses the relevant skills to support and improve decision-making processes, either on their own initiative or in response to a request addressed to them (see, for example: [10, 58, 59]). Expert advisors are now pretty much ubiquitous in our culturally science- and technology-shaped European societies, despite the endemic uncertainties, ambiguities and knowledge gaps which also characterise the provision of such advice to societal actors [8].

In today's Europe, one main challenge relating to ethical expert advice appears to be the question of how to define it in the context of orientation towards the increasingly participatory and inclusive democratic governance of complex matters of science and technology. Expertocracy and the strong reliance of policy-makers on narrowly defined expertise—such as purely scientific expertise—are now widely seen as obsolete approaches to the governance of science and technology. This shift can be contextualised within broader developments in modern societies that have been conceptualised and analysed in such theoretical approaches as the "risk society" [4], "the network society" [11], and the "postmodern society" [32]. In all these concepts, modern societies are conceived of as being exposed to new, often large-scale risks brought about by scientific and technological developments. As Beck [4] has argued, such risks, which increasingly endanger life on earth, are systematically produced in modernisation processes. They are thus an inherent feature of technological and economic development in the social and production systems of modernity and are apparently here to stay.

While increasing doubt has been cast in our ambiguous times on the technocratic dream of an omnipotent expertocracy and on the more modest and democratic belief in strictly science- and evidence-based political decision-making, modern society is still increasingly preoccupied with the future and with issues of safety, risk sustainability and responsibility. This all takes place against the backdrop of a strong focus on successful innovation in a highly competitive, global economic setting. It is no wonder then that the question of how to govern and regulate new and emerging science and technology, at a time when so-called "post-normal" science [30, 45] is on the rise—characterised as it

is by risks that appear fundamentally different to all former risks—has now become a crucial one.[1]

In the past, two prevalent models were used to structure the relationships between scientific experts and policy decision-makers [35, 51, 58, 59, 84, 85]:

1. The decisionist model assumed political governance to be truly and solely the responsibility of the political system, which itself would create the necessary normativity.[2] According to this model, a clear and strict division of labour exists between experts and political decision-makers: science should provide factual information, and policy-makers should use expert-based knowledge for their decisions. Norms and values play a central role in these decisions, while facts are neutral and objective. Science-based expert advice already plays an important role in this model, yet its role is clearly subordinated within the process of political decision-making.
2. On the contrary, technocratic approaches to political decision-making tend to emphasise to varying degrees the role of experts as informal or even formal decision-makers.[3] From a technocratic point of view, the division of labour between those who choose the ends of policy and those who select the means by which to attain these ends breaks down and the roles become blurred. In decidedly technocratic approaches, the decisions taken by assumedly impartial experts should replace the governance shaped by politicians and (other) representatives of vested interests. Even more often than proponents of expert-based decisionism, technocrats tend to see ordinary citizens and the general public as biased or irrational, extending this negative view to politicians as the population's representatives. Policy decisions should be taken by experts and supported mainly or solely by bureaucrats (civil servants, public officials etc.) [59]: 625. Experts play the role of a "scientific power elite", a "new clergy", a "scientific estate", "New Mandarins" etc. [85]:134. In EU countries such as the Federal Republic of Germany, expert policy advice was considered as a dual resource of both authority and reason:

> On the one hand, since the 1950s, primarily, knowledge that counts as "objective"—that is, "not ideological"—has been labelled "scientific" and "superior." On the other hand, scientific counselling provides justification for introducing protectionist policies in decision making, which would otherwise be perceived as "lobbying" [48]: 816.

Both models of the relationships between scientific experts and policy-makers increasingly appear outmoded in today's society. One reason for this perceived obsoleteness is a legitimisation dilemma:

> Taken together, the two models constitute the two sides of the legitimatisation dilemma in which policy-makers and experts find themselves in modern mass democracies: actions taken on a decisionist basis tend to suffer from a legitimacy deficit due to their inherent lack of rationality. Technocratic decision-making, on the other hand, tends to suffer from a legitimacy deficit due to the lack of public approval [85]: 137.

[1] Three types of risks can be differentiated in this context: simple, complex and uncertain risks. In the case of simple risks, all necessary knowledge is available in principle. Risk management can be based on well-established routines. In the case of complex risks, the basic scientific knowledge is also available in principle, but the relations between the relevant variables of research, development and innovation are so complex that there is dissent within the scientific community about the potential effects of the new and emerging science and technology in question. Uncertain risks are risks whose relevance or very existence are in question, for example on normative or epistemological grounds; this can also involve value conflicts. Even in Europe, disagreements can be observed with regard to important societal and cultural values, for example concerning the topic of human enhancement: "[s]ome may applaud the possibilities of memory improvement through brain implants, while others will see that as blasphemous tinkering with God's creation" ([5]: 161) or as irresponsible tampering with (human) nature.

[2] The intellectual origin of this model can be traced back to the sociological work of Max Weber, Emile Durkheim and others. Weber, for example, recognised that the idea of assigning full responsibility for all aspects of policy-making to bureaucrats and technocrats is attractive at first glance, but argued that this approach was unrealistic because political decisions could never be made solely on the basis of facts and objective knowledge since, although the choice between "means" may take place in a rational way, the choice between the "ends" and objectives of policy and the underlying values remain irredeemably subjective [82].

[3] Its intellectual roots can be traced back to Auguste Comte and Henri de Saint-Simon. The case of Merton's model of disinterested scientific elite is also illustrative.

According to widely shared views in current discourse on the governance of science and technology, neither experts nor politicians should be the sole or dominant decision-makers.

What is more, the originally mainly anti-technocratic criticism of the role of experts has been extended to include even their (subordinate) role in decisionist policy-making: concerns that this model of political decision-making suffers from a relatively low degree of rationality (due to excessive political instrumentalisation of expert knowledge or to politicians ignoring such knowledge) are now often replaced by fundamental doubts about the notion of scientific objectivity or by the view that any privileged reliance on expert knowledge runs contrary to democratic governance since the crucial challenge is to realise a governance of science and technology that is socially inclusive and involves all relevant stakeholders (with their various kinds of expertise) as well as the general public.

Against this backdrop, and also in order to increase the social legitimacy and political sensitivity of expert advice, it has been argued that new forms of cooperation and communication should be created such as "hybrid forums" [10]: 34, "boundary configurations" [33]: 340 and "intermediaries" [41]: 85; [73]: 212, in which experts, politicians, ordinary citizens and a wide variety of stakeholders would come together to develop common decisions. This search for a new model of policy advice also includes the appeal for a new type of "open expertise" or "open-context expertise" [22]: 49.

The older models of governance of new and emerging science and technology have only been the target of widespread criticism in the EU since the mid-1990s in the wake of such events as the BSE crisis, food safety scandals and the controversies over genetically modified organisms (GMO). Since then, increasing ground has been lost by narrative about neutral scientific experts who provide objective and unbiased knowledge that lies outside of social interests and power configurations and escapes moral and social influences [56]. Prior to this process, the EU often displayed a highly technocratic attitude towards the governance of science and technology. Some even argue that the EU's approach "…was paternalistic, involving reliance on undisputable experts" [3]: 71. Often with explicit reference to the public outcry over various science and technology scandals and to the problems of public acceptance of GMO food, a new kind of governance of emerging fields of science of technology such as nanotechnology became a policy goal of the EU [54]. This process of policy reorientation appears to have been furthered by mass media reporting in many European countries [65]. Mass media can be deemed a relevant factor in the creation of a new type of relations between experts, politicians and the public "…. due to their presentation and assessment of scientific findings and their reconstruction of political disputes and conflicts built around these findings" [73]: 201. When for example the German government set up the German National Ethics Council in 2001 in order to structure public discourse on issues of biomedicine, this decision came under fierce attack in the mass media. The German National Ethics Council was criticised by some journalists as being used by the then German chancellor Gerhard Schröder as an instrument to create public acceptance for political decisions already taken prior to the deliberations of the Council. Replacing the focus of public bioethical discourse on pre-implantation diagnosis and embryo research, the institutional design of this EAB moved into the forefront of the debate. These discussions subsequently extended even to such questions as the appropriate status of experts and citizens in the governance of biomedicine in general and the meaning of "ethics" and its proper relevance to policy-making and politics [9].

Recent developments in R&D and discourse on new and emerging science and technology have further complicated the picture [36]. Various developments in R&D, for example, are conceived of and discussed as the convergence at the nano scale of several broadly defined yet core fields of science and technology fields. This concept of converging technologies (CT) focuses on new and emerging technologies derived from synergistic combinations and the mutual stimulation of developments in such expansive domains of R&D as nanotechnologies, biotechnologies, information and communication technologies and neurotechnologies, and the corresponding sciences and research fields (nano-bio-info-cogno/NBIC convergence) [67]. The underlying developments, their potential ethical and societal implications and the notion of NBIC convergence itself have been the subject of controversial debate for almost a decade now (for an early European initiative on CT, see [61]; for an overview, see [75]), especially in this journal (e.g. [37, 39, 72, 74]). The NBIC convergence concept's inventors and others, including a number of

decidedly futurist thinkers (e.g. [49]), have argued that new and emerging technologies at the points where the NBIC domains overlap may or will give rise to major innovations with massive and potentially highly beneficial societal impacts, driving the growth of knowledge societies, producing applications that will profoundly expand the current spectrum of human performance, solving a wide variety of societal problems and in general fundamentally transforming individuals, groups and societies for the better (e.g. [2, 47, 68, 87]). Others have expressed concerns about the development and commercialisation of CT, warning that these could pose risks to the environment, to human health, to the safety and security of our societies, to the stability of social structures or entire societies, and to universally or widely shared moral values and belief systems ([34, 44, 71, 89]; for an overview, see [75]). Yet others have argued that the concept and promoted goals of NBIC convergence stem from highly controversial (e.g. transhumanist) or impoverished notions of human anthropology and society, or have criticised that the governance approach of many promoters of NBIC convergence is technocratic and that the conceptualisation is unsound and rests on an empirically weak basis (for an overview, see [14]). As regards the relationship between ethics and the social shaping of science and technology (which naturally includes policy-making), it has been argued that unduly speculative ethics such as the approach followed by transhumanists and other promoters of NBIC convergence runs contrary not only to academic epistemological standards but also to the goals of science and technology policies in Europe and elsewhere [14, 62].

The outlined developments since the mid-1990s, which broadened tendencies already present in the ecological movement of the 1970s and 1980s, have led not only to a further decline of expertocratic approaches but also to a more far-reaching criticism of scientific expertise in policy-making [9, 15, 22, 27, 69]. This repudiation of so-called objective expert knowledge and of the role of scientific experts in policy-making was prepared by the social-scientific and humanist research on science and technology and their politics which has taken place since the 1970s. In science and technology studies (STS), for example, it is often emphasised that expert knowledge is (i) subject to inherent contingencies and as such cannot be value free, (ii) contextual and therefore necessarily partial, temporary and subject to matters of evaluation, and (iii) dynamic in the sense that experts must always compete with the interpretations of others and go beyond the boundaries of undisputable scientific knowledge due to the fact that they are required to respond to questions that are framed by non-scientific rationalities [16, 52]. Specific problems arise when the topics under discussion include wide-ranging forecasts and speculations about the future development of the sciences and technologies in question [36].

National Ethics Advisory Bodies in Europe

One major means of institutionalising policy advice on ethically contentious issues in Europe was the creation of a network of national ethics committees. In Europe, the spread of such EABs started in the mid-1980s. Over the past two and half decades, most European countries have established advisory groups, ethics council or committees at the national level [6, 28]. One of the main goals of national EABs is to draft opinions on ethical questions in order to give advice to national decision-makers. This advice primarily concerns questions relating to science and its applications; in their initial phase these institutions often focused on biomedicine. Their rise contributed to and reflected the formation of a European "ethical identity" which encompasses both an ethical and an epistemic vision, the latter often being expressed in the increased use of the precautionary principle. As has been noticed [31], this process has been encouraged and driven forward at the level of such core EU institutions as the European Commission and the European Parliament by various policy initiatives and by means of different policy instruments.

When the Group of Advisers on the Ethical Implications of Biotechnology (GAEIB) was established in 1991, "ethics" was incorporated into the decision-making process on the basis of an ethical expertise model. Concomitantly, biosafety EABs were set up in many EU member states in order to address the potential negative impacts of GMOs on human health. In 1997, GAEIB was replaced by the European Group of Ethics in Science and New Technologies [21], whose mandate has been renewed several times since then. Unlike the GAEIB, the EGE was given a broader mandate to address controversial issues relating to all kinds of new and emerging science and technology.

The process of institutionalisation thus reflects a development which can be characterised either as a thematic expansion of bioethics through the creation of diverse subfields such as neuro- and nanoethics, or as a rise to more public prominence and political relevance of areas of science and technology ethics other than bioethics, following in the footsteps of bioethics. The task of EGE is to provide the European Commission with expert advice on ethical aspects of new and emerging technologies; this advice should help improve the preparation and implementation of EU science and technology legislation and policies. In this sense, the EGE's role is that of an ethics committee at the EU level. The European Commission also supports a number of relevant European networks such as the Forum of National Ethics Councils (NEC Forum), whose members are the chairpersons and secretaries of national EABs. The NEC Forum has twice-yearly meetings hosted in each case by the National Ethics Council of the country currently holding the EU Presidency. It seeks to encourage the early review of emerging ethical issues and to promote and facilitate the exchange of good practices between member states. The idea for the NEC Forum was developed by the European Commission in the early 2000s, and its first meeting took place in 2003. Each meeting of the NEC Forum also includes a joint session with the EGE. The European Commission sees the roles of the EGE and the NEC Forum as complementary, with the former providing high-level specialist ethical advice to the European Commission, particularly in relation to the policy arena, and the latter as a networking activity aimed at sharing information and exchanging best practices on issues of ethics and science. One could argue that the EGE and the NEC Forum have together contributed to a Europeanisation of ethical policy advice (despite national regulatory and cultural differences and the "principle of subsidiarity") and in so doing have also sharpened the profile of Europe's "ethical identity". They may even have strengthened the character of the EU as a community of shared moral values by furthering reflection on common problems and the variety of approaches chosen to tackle them in Europe.

An important development in the early phases of bioethics institutionalisation was the change in the status of national EABs from ad hoc to permanent committees. Among other things, this made it possible for the mandate of many of them to be later extended to cover all kinds of new and emerging science and technology. What is more, the understanding of ethics embraced by these permanent committees has become much broader than most involved stakeholders originally anticipated. The British Warnock committee can serve as an example in this context [88]: Mary Warnock, the committee's initiator, called for it to have permanent status, insisting that only a permanent committee would be able continuously to monitor a wide range of ethical problems arising in both medical practice and research. She also claimed that ethically contentious research would continue to face massive public criticism for as long as decision-making on an ethical basis was not highly visible.

Recently, however, EABs have themselves been confronted with various kinds of criticism. Some have argued that obsolete elitist, technocratic and positivist expert models still have too much influence on them and that the results of the institutionalisation of ethical policy advice in Europe so far are disappointing:

> …the emergent pluralist, inclusive and interdisciplinary dialogue that was at the core of a potentially new way of shaping public policy has instead been largely reduced to the bureaucratic mechanism of expert ethical advice, deriving from procedures which are identical to those for scientific advisory committees [25]: 47.[4]

A member of the U.S. President's Council on Bioethics created by George W. Bush expressed another critique which targeted what he and other Conservatives see as the mainstream of current bioethics:

> …bioethicists as members of committees have become nothing more than sophisticated (and sophistic) justifiers of whatever it is the scientific community wants to do, having enough knowledge of Catholic theology or Kantian metaphysics to beat back criticisms by anyone … who might object strenuously [29]: 204.

And some observers even reject the legitimacy of national EABs in general, arguing that

> …they do not fit into the democracy as a form of political government insofar as neither are they

[4] In this context, Felt and Wynne [25] also point out that the EGE insisted on the non-public character of much of their work; its sessions are closed, and the participation of a limited public is allowed only during roundtables (one for each opinion delivered).

> constitutional organs, nor are their members elected by any kind of democratic procedure, nor do they have to be representative at all [27]: 304.

What these three very different criticisms all have in common is that they launch an attack on the expert-oriented character of institutions of ethical policy advice and the expert status of their members. An interesting comparison can be made in this context between EABs and another type of policy advice institution that in recent times has dealt increasingly with ethical aspects of science and technology, namely parliamentary offices and other institutions of technology assessment (TA). The TA concept has its origins in the late 1960s in the USA and developed primarily as a means of providing parliamentary and other policy advice. It has gained prominence in Western European countries since the 1970s. Many EU member states now have national TA institutions, some of which focus on providing advice to parliaments or other political institutions while others include or even focus on the public communication of science and technology activities and public dialogue. These national institutions have also developed various forms of cooperation such as the European Parliamentary Technology Assessment (EPTA) network and are also present in various ways at EU level. Some people have argued that EABs are currently facing the same dilemma as TA institutions did roughly one decade ago [18]. TA institutions have a narrowly expert-oriented past with strong technocratic elements, and their early institutionalisation was achieved in very close proximity to parliaments and other political institutions. The expectation that developments in science and technology could be forecast on the basis of scientific expertise [85] was the core feature of so-called "classical TA"; this may be deemed an artefact or myth, but can serve to highlight the genuine trend towards less expert-oriented, participatory models of TA. These institutions analyse, in an increasingly comprehensive and participatory manner, the social, economic, environmental and political aspects and impacts of scientific and technological developments [20, 64]. More recently, they have also begun to analyse a variety of cultural aspects and the cognitive content, strategic use and "real-world" impacts of expectations and future visions in discourse on new and emerging science and technology [14]. At the same time, large parts of the field of TA have since the late 1990s been influenced by a broad "ethicisation" of science and technology controversies [6] which frames or reframes many political and other issues as ethical ones.

One could argue that EABs, like many TA institutions, have undergone a shift to what has been called "civic epistemology" [42]: while TA institutions more and more often have to deal with ethical aspects, EABs increasingly have to take into account not only narrow (bio)ethical aspects when preparing their opinions and recommendations, but also broader societal contexts [26]. The demands to undergo this shift are not only pragmatic in nature (such as the argument that citizens have the right to be included in political decision-making because they contribute to advances in science and technology as taxpayers or consumers); they are also substantial, including with respect to democratic theory. National EABs work in a highly contested and highly politicised domain. Under these conditions, their work truly needs to be "…socially robust" [63].[5] Social robustness in this context means the knowledge produced is not only scientifically sound but also socially acceptable and, ideally, useable in different social contexts.

Material and Methods

In the empirical part of our study, we analysed the role and functioning of national EABs in 32 European countries. We focused, to adapt a phrase from Stephen Hilgartner's *Science on Stage: Expert Advice as Public Drama* [38], on the "front-stage" of EABs, i.e. in our case the public display of these institutions. We selected institutions on the basis of a WHO definition [86]. According to the WHO, national ethics committees are official national bodies appointed by ministers of health, other chief executives or legislatures with the remit of providing advice about bioethics and the ethics of health to their executive and legislative

[5] According to Bijker et.al [5], there are three aspects closely related to robustness of knowledge: (1) its validity is tested both inside the laboratory and outside in the world where innovations are shaped by social, economic and cultural factors; (2) it needs to be achieved by including in the group of scientific experts other relevant social groups with experience as users, patients or other stakeholders; (3) society is no longer merely the addressee of science, but an active partner participating in the production of social knowledge ([5]: 157).

branches, and in many cases to the public. They analyse the relevant issues and offer conclusions and recommendations, especially with a view to the development of national policies and legislation. National ethics committees can be characterised as a special, albeit prominent, type of ethics advisory bodies.[6]

In selecting institutions, we mainly consulted the lists of members of or participants in the European Conference of National Ethics Committees [60], the Forum of National Ethics Committees [60] and the WHO Global Summit of National Bioethics Advisory Bodies [86], though we also took into account the selection samples used in previous empirical studies on national EABs [1, 17, 28]. In most countries we identified and selected those EABs that serve as the de facto national ethics committee, while in some countries—such as Norway, where there are several specialised national EABs rather than one national ethics committee, and the UK, where there are several specialised national EABs in addition to a national ethics committee—all such national EABs were selected. Our final selection encompassed 50 national EABs in 32 European countries and included all 27 EU member states, as well as five other countries (EU candidate country Croatia, potential EU candidate country Serbia and the non-member countries Iceland, Norway and Switzerland).

n order to gather information about the character of national EABs and the way they function, we focused specifically on the transparency and participatory features of their work, e.g. the availability of information on their websites, the publication of work results, events which the public can attend, discussions open to the public, and the employment of public participation mechanisms. We followed three main methodological approaches:

1) In the first stage, we analysed all of the official websites of the 50 EABs in Europe which provided us with an initial and very general overview of the transparency of EAB work. This also included an overview of the policy advice and other opinion documents available online. Our analysis revealed that one group of EABs has well-organised websites that provide extensive information about the institution's function and structure and make policy advice documents available, often in more than one EU language.[7] A second group comprises EABs without well-organised websites. They offer only scant information about the institution's structure and function and make no policy advice or other opinion documents available, or in some cases have no website at all. [8] As can be seen from the results of our analysis, EABs with well-organised websites only exist in traditional "Western" democracies, while the EABs that lack such websites are largely those to be found in post-Communist countries. This might be explained by local democratic cultures and traditions, including the fact that EABs in "Eastern European" countries traditionally function as closed expert groups that do not make their work results available to the general public, or indeed by financial constraints.
2) In the second stage, we developed a comprehensive questionnaire, taking into account previous empirical studies on national EABs [1, 17, 28]. This questionnaire was designed to obtain relevant information directly from the EABs, and consisted of forty questions aimed at eliciting information about the establishment of the individual EAB, its thematic orientations and priorities, its internal functioning, its political impact with regard to policy-makers and its relationships with the public.[9] 21 EABs from 15 European countries filled in the online questionnaire: 16 EABs from 13 EU member states (Austria,

[6] Other EABs can perform more specialised tasks such as addressing only one narrow domain of science, technology or medicine, or can be charged with examining ethical aspects of research projects and proposals such as in the case of research ethics committees.

[7] Only half of the 32 selected countries (Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom) has well-organised websites.

[8] EABs in five countries (Bulgaria, Latvia, Malta, Romania and Slovakia) have no website at all. The website of one country (Ireland) was closed because the EAB had been discontinued due to a lack of funding. EABs in four countries (Czech Republic, Croatia, Estonia and Serbia) have websites that contain only very basic information and make no policy advice or other opinion documents available, while the EABs in six countries (Hungary, Iceland, Lithuania, Luxembourg, Poland and Slovenia) have websites that offer basic information and a few opinion documents. None of these documents deal with new and emerging science and technology.

[9] The questionnaire was installed in the Bristol Online Survey system. The invitations to take part in the survey were sent out between July and November 2011 to representatives of all 50 selected EABs using a variety of communication channels, including e-mail, telephone and fax. For this purpose, we also used our existing personal and institutional contacts.

Cyprus, Denmark, Finland, France, Germany, Greece, Italy, Lithuania, Netherlands, Spain, Sweden, United Kingdom) and five EABs from two non-EU states (Norway and Switzerland). With one exception, no EABs from new EU member states responded, which corroborates findings of earlier empirical studies [1, 28] that EABs in these countries are for various reasons less prepared to communicate with the outside world.

3) In the third stage, using the results of the work in the first two stages, we analysed the content of opinion documents available in English on the institutional websites. The number of such documents in English is high: the great majority of EABs that publish opinion documents at all also provide documents in English. We took into account all documents published in the 2000s, as well as selected ones from the 1990s. Documents from the 1990s were selected if they covered issues concerning ethical controversies of human enhancement technologies. Our primary goal during this phase was to gain insights into how (if at all) EABs define their role as inclusive anticipatory "hybrid forums".

Results & Discussion

As already pointed out in the introduction, the situation of EABs in Europe is becoming increasingly paradoxical. On the one hand, the professional advice issued by EABs is requested by policy decision-makers interested in future advances in science and technology. On the other hand, expert-based policy advice institutions such as EABs are increasingly subjected to strong criticism by different stakeholders and in academic research. At the same time, it is widely claimed that EABs should play a crucial role in improving political decision-making on ethically controversial new and emerging science and technology, forming a core element of "good governance" of science and technology [7, 40] and of a new strategy of responsible research and innovation.

EABs currently find themselves working in an era of "hyper-choice". In many areas, such as genetic testing, genetically modified crops, nuclear energy or mobile phones, a vast array of scientific experts has been mobilised to investigate, discuss and assess the risks and benefits at stake, yet all this analysis, discussion and assessment has apparently not made the issues any less contentious [9, 53]. The expert opinions and recommendations for political decision-making are never made in a social vacuum, but are the result of various societal factors. Due to the complexity of the issues at stake in new and emerging science and technology, expertise has become ever more problematic. Current expert bodies, including EABs, tend to refrain from making recommendations to decision-makers about what needs to be done, preferring instead to outline options and provide knowledge upon which to base action. Nowadays, an expert opinion appears to be but one voice among many. Likewise, the now fashionable calls for a new role of "scientific citizenship" should not be overly ambitious. For a new strategy of responsible research and innovation, it would appear that increased public participation[10] and the use of expert knowledge are necessary when it comes to the governance of ethically controversial new and emerging science and technology. Specific problems arise, however, in fields of emerging science and technology whose future relevance is still controversial and in which far-reaching and ideologically contentious visions of the future abound [14, 26, 36].

In our empirical analysis, we asked national EABs to explain whether the opinions they produced have only been accepted and discussed by policy decision-makers (e.g. in parliamentary debates or published policy documents) or whether they have been explicitly used in legislation or mentioned in court orders. 15 EABs from 13 countries responded that several issues surrounding new and emerging science and technology that had been discussed in their opinion documents had been used by political institutions. In the case of studies which explicitly dealt with the contentious topic of human enhancement, the work results of only two EABs, both from Norway, were used by political institutions. This may have been due to the fact that these two institutions, unlike the vast majority of other EABs, play a formalised role in the political decision-making process. Four EABs (German Ethics Council, Italian National Bioethics Committee,

[10] It should be noted that some authors argue that public participation often serves merely to legitimise political decisions rather than genuinely increasing the role of stakeholders and the public in science and technology governance. One instance of such tactical use of public participation would be the promotion of forms of public engagement that are oriented towards strengthening consumer society within a framework of post-Fordist politics ([76]; [77]).

Nuffield Council on Bioethics, British Medical Association Medical Ethics Committee) reported that their work results relating to new and emerging science and technology had been explicitly used in legislation or mentioned in court orders. Where EAB documents are used in legislation or mentioned in court orders, this appears to happen either indirectly, without the source being explicitly named, or without the EABs receiving any direct feedback about the use of their documents by political institutions.

Based on the results of our empirical analysis, we can conclude that EABs mostly give ethical advice which neither takes the form of nor gives rise to obligations or legislative acts. This is in keeping with the European Commission's tendency over the past 10–15 years to promote the use of "soft" tools as flexible instruments in the governance of new and emerging scientific and technological developments. Legal norms are often regarded as being insufficiently flexible for the governance of rapidly evolving and ethically controversial techno-sciences.[11] The relevance of soft regulation tools grew when Europe came to be increasingly understood as a knowledge society. In its White Paper on European Governance [23], for example, the European Commission stated that legal rules need to be complemented by a broad variety of non-legislative policy instruments. The European Parliament, however, has adopted a resolution to stop the proliferation of soft law instruments. The European Parliament came to the conclusion that soft law does not provide efficient judicial protection [24].

Referring to the extensive use of "soft" regulations in the European Union, some have argued that "the EU is experiencing the political fiction of democratically deliberated policies, because these instruments have been used to introduce norms outside the traditional process of law-making" [25]: 43. Such instruments (for example EU guidelines and EU codes of conduct[12]) are indeed widely used and aim to avoid regulatory actions being applied prematurely, i.e. to emerging science and technology whose nature is not yet fully understood, and to make sure that interventions are not made too late, thereby missing the opportunity to prevent negative effects. Codes of conduct are considered to be particularly useful when the emerging science or technology in question is still fraught with many uncertainties. Such a code proved helpful in the field of nanoscience and nanotechnologies, for instance [79].

In our empirical investigation, we explored in some detail whether European EABs use mechanisms of public involvement in controversies surrounding ethical aspects of new and emerging science and technology. Are they already following the recent trend towards calling for more open and transparent decision-making processes in the governance of science or technology, and do they really use any approaches to public engagement?

In the last few years, many interactive models of public engagement have been developed by STS writers in order to analyse the role and improve the participation of citizens in shaping science and technology and the related policies [66]: 197. In our empirical analysis we aimed to go beyond the distinction between passive and active public engagement. Instead, we adopted a typological distinction based on an "information flow model" [70]. We use this distinction as a theoretical framework for conceptualising the types of public involvement as practised by EABs when forming their opinions on ethical issues.[13] We distinguish between three public involvement mechanisms, namely (1) public communication, (2) public consultation and (3) public participation [70]. We were able to identify whether those EABs which were the subject of our empirical investigation focus merely on bringing the results of their work to the general public in order to gain attention and inform or educate (one-way communication with the public), or whether they enable actual public participation in their discussions and work. In this context, we asked EABs several questions concerning their relationship with the public and their use of public communication (see Table 1).

[11] Before 2000, legal aspects played a role mainly with regard to the harmonisation of the markets of the member states. This privileged position of legal rule-making was reinforced when the European Economic Community, which was based primarily on the free movement of goods, labour, capital and services in a common market,became the European Union, a political entity framed by a Constitution and a corpus of fundamental human rights [55] .

[12] The European Commission encourages the EU member states to use code of conducts as instruments to encourage productive dialogue amongst "policy makers, researchers, industry, ethics committees, civil society organisations and society at large" [12].

[13] Kelly argues that the emergence of EABs, seen as "an intuitional forum for authoritative judgments about difficult areas in science that require explicit consideration of societal values as well as technical evidence" ([46]:340), is a result of the confluence of interest in public participation in science and technology decision-making and moral framing of life sciences disputes.

Table 1 The use of public involvement mechanisms by EABs

EAB	Publish the work results	Public discussion	Organising public events	Specific public participation mechanism	Involving particular target groups	Public involvement mechanism
Nuffield Council on Bioethics (UK)	Always	Sometimes	Dialogue & debate; presentation of findings; education.	Public consultations; fact finding meetings; deliberative workshops.	People with dementia.	Public participation
German Ethics Council	Always	Sometimes	Dialogue & debate; presentation of findings; education.	Public participation in discussion; online discourse project.	Persons concerned.	Public participation
Norwegian Biotechnology Advisory Board	Always	Always	Dialogue & debate; education.	Yes, but not specified.	Yes, but not specified.	Public participation
Finnish National Advisory Board on Social Welfare and Health Care Ethics	Always	Always	Yes, but not specified.	Yes, but not specified.	Yes, but not specified.	Public participation
Hellenic National Bioethics Commission	Always	Always	Dialogue & debate; education.	Monthly educational seminars; use of E-forum.	No	Public participation
Italian National Bioethics Committee	Always	Never	Presentation of findings.	Surveys.	No	Public consultation
The Health Council of the Netherlands	Always	Never	No	Occasional hearings with stakeholders.	Patient organisations.	Public consultation
Austrian Bioethics Commission	Always	Never	Dialogue & debate; presentation of findings.	No	Through public events and expert hearings.	Public consultation
Swiss National Advisory Commission on Biomedical Ethics	Always	Sometimes	Dialogue & debate; presentation of findings.	No	Public hearings.	Public consultation
French National Consultative Ethics Committee for Health and Life Sciences	Always	Never	Dialogue & debate; education.	No	Deaf people; autistic persons; persons diagnosed with a genetic disease.	Public consultation
Norwegian National Committee for Medical and Health Research Ethics	Always	Never	Dialogue & debate.	No	No	Public comm.
Lithuanian Bioethics Committee	Sometimes	Sometimes	Dialogue & debate; education.	No	No	Public comm.
Spanish Bioethics Committee	Always	Sometimes	Dialogue & debate; presentation of findings.	No	No	Public comm.
Cyprus National Bioethics Committee	Always	Sometimes	Dialogue & debate.	No	No	Public comm.
Norwegian National Committee for Research Ethics in the Social Sciences and the Humanities	Always	Never	Dialogue & debate.	No	No	Public comm.
Norwegian National Committee for Research Ethics in Science and Technology	Always	Never	Dialogue & debate.	No	No	Public comm.

Table 1 (continued)

EAB	Publish the work results	Public discussion	Organising public events	Specific public participation mechanism	Involving particular target groups	Public involvement mechanism
Danish Council of Ethics	Always	Always	No	No	Panel of experts.	Public comm.
British Medical Association Medical Ethics Committee	Sometimes	Never	No	No	Patient groups and others with interest and expertise.	Public comm.
Swedish Council on Technology Assessment in Health Care	Always	Never	No	No	Patients.	Public comm.
Danish National Committee on Biomedical Research Ethics	Always	Sometimes	No	No	No	Public comm.
National Research Ethics Service (UK)	Always	Never	No	No	No	Public comm.

Evidently, five of the 21 surveyed EABs—namely the UK Nuffield Council on Bioethics, the German National Ethics Council, the Norwegian Biotechnology Advisory Board, the Finnish National Advisory Board on Social Welfare and Health Care Ethics and the Hellenic National Bioethics Commission—practise the most inclusive approaches to public engagement, involving different stakeholders and members of the general public. Public participation practices are based on information being exchanged among all parties. This group of EABs differs from other groups not only in that it regularly (Finland, Germany, Greece, Norway and UK) publishes its work results, but also in that it stages public discussions and employs specific public involvement mechanisms (such as deliberative workshops, online discourse projects, educational seminars). Another five of the 21 surveyed EABs—namely the Italian National Bioethics Committee, the Health Council of the Netherlands, the Austrian Bioethics Commission, the Swiss National Advisory Commission on Biomedical Ethics and the French National Consultative Ethics Committee for Health and Life Sciences—employ public consultation mechanisms such as surveys, hearings and public events, though these activities are usually targeted at the general public and do not include formalised dialogues between different stakeholder groups. The largest group consists of 11 EABs which communicate with the public only by providing information—without elements of interaction—about their work, generally by publishing their work results either regularly or occasionally.

When asked to name specific public participation mechanisms that they use, most of the EABs did not respond at all, even if they had indicated that they organise public events aimed at stimulating public dialogue and debate. When asked whether they involve specific target groups when discussing specific topics, on the other hand, roughly half the EABs responded, 11 of them naming such groups as patient groups or individuals suffering from dementia or autism. One explanation for this could be that the EABs, when forming their opinions, involve to a certain degree members of the public for whom the topic in question is of personal relevance; in general, however, they do not identify themselves as institutions that are open to the public. Public involvement therefore appears to be context-driven or context-oriented. The fact that most of the target groups named by EABs are

patient groups or patients indicates that interaction with the public relates to medical topics, in line with a long tradition of including laypeople in early research processes in medicine [52].

If the purpose of public involvement in science and technology (i.e. the inclusion of citizens and stakeholders without advanced scientific knowledge) is to ensure that "public values are included into scientific considerations" [66]: 199, we must conclude that the current "participatory turn in scientific governance" [9]: 774 and "democratic turn towards active citizen participation in science and technology" [57]: 545 is not yet reflected in the work of the surveyed EABs, as most of them do not employ any specific mechanisms for this purpose. This might be due to the fact that the general political culture in many countries [48, 78] is rather opposed to non-expert forms of policy advice; this could be explained in turn to some extent by the fact that many aspects of new and emerging science and technology are extremely difficult to understand for the public, with the exception of a few alternative experts from civil society organisations. One solution to this in expert-oriented EABs could be to systematically educate members of the public in the science and technology in question before involving them in the opinion-forming processes of EABs, a practice that so far only few of these institutions in Europe have embraced.

Our empirical survey also showed that national EABs in Europe have a variety of functions and designs. In order to better understand this variety, EABs can be usefully contrasted with those institutions which are known in the English-speaking world as "think tanks". Think tanks are expected to provide expert-based knowledge for policy-makers and other societal actors. Frequently, however, particularly in the case of advice on science and technology, this knowledge is rather technical and normative aspects are dealt with only superficially. Moreover, it is often not suitable for use as the basis for broad societal discourse on the given science or technology topic. That said, expert-based science and technology assessment activities can contribute to the governance of science and technology, not only by supplying information and helping generate knowledge but also by supporting communication processes, offering new perspectives on the issues in question and creating new opportunities to restart a debate that finds itself in a deadlock [50].

In principle, EABs are designed to go beyond these models of policy advice. Like other advisory institutions, they are required to provide expertise (in their case, ethical expertise that takes other expertise into account) and help identify and open up new perspectives; above all, however, they are expected to help policy-makers and entire societies deal with value conflicts and ethical dilemmas. The role of EABs is usually also to help legitimate the actions of leading policy actors in the context of new and emerging science and technology where ethical and risk issues are at stake, therefore the question of involving a broader range of stakeholders as well as the public in participation appears to be a crucial one in framework of responsible research and innovation. Our study shows, however, that most EABs in Europe still function primarily as expert bodies rather than as "hybrid forums".

Conclusion

Given the growing institutionalisation of the ethics of science and technology, a trend which has been accompanied by greater expectations and fears concerning new and emerging science and technology and by increased emphasis on the European Union as a community based on shared values, we developed a theoretical framework that attempts to explain recent transformations and conducted empirical research on the changing role and function of EABs as institutions that can significantly contribute to the production of socially robust knowledge and to responsible research and innovation.

In the last few decades, we have indeed been able to observe an increasing institutionalisation of policy advice in this context, which has also led in most European countries to the establishment of EABs functioning as national ethics committees. As policy-makers have been increasingly faced with uncertain choices and complex decisions regarding the management of technological innovations, they have come to rely strongly on expert advice in order to legitimate and ground their decisions in expert knowledge. In the past decades, however, public outcries and even revolts at the unintended consequences of new and emerging science and technology—such as the BSE outbreak, privacy and discrimination concerns about information and genetic technologies, and the negative societal impacts of monopolised GMO use—have led policy-makers and others to reconsider the role of experts as trusted and unbiased authorities. In such a

situation it is obviously no longer viable to rely solely on traditional mechanisms of decision-making. Societal mistrust of expert authority and doubts about the predominantly positive impacts of science and technology, intensified by critical media framing, have resulted in calls for a wider set of stakeholders and the public in general to be included in the governance of science and technology. This has led expert institutions such as technology assessment offices and EABs not only to consider examining more broadly the ethical, legal and societal impacts of scientific and technological developments, but also to attempt to include "civic epistemology" through wider societal deliberation and consultation. Ideally, such extended institutions and processes would help give rise to scientific and technological innovations that are widely socially acceptable. Given the complexity and uncertainty of the impacts of scientific and technological innovations on society, however, this should not entail a marginalisation of expert knowledge in policy advice on ethically controversial issues in science and technology, but a broadening and enrichment of the advice provided, also by including more academic disciplines and intellectual approaches in the production of knowledge for decision-makers and public discourse on science and technology.

Taking into account the changing European governance framework for science and technology, the empirical part of our study focused on EABs as key institutions in this area. We examined the structure of EABS in 32 European countries and explored how they function. The primary focus of our empirical examination was to ascertain whether EABs are developing in the direction of "hybrid forums", institutions that would integrate expert knowledge with public participation and wide stakeholder consultation in a transparent and pluralistic manner, performing anticipatory examinations of contentious new and emerging technologies and offering policy-makers societally useful advice on contentious new and emerging technologies.

We found that many EABs lack a precisely defined role and that political institutions are in most cases not formally required to take the work results of EABs into account. The impact of most EAB work results should be seen in the context of the "soft" regulatory instruments favoured by several EU institutions, among them the European Commission, on account of their flexibility in addressing new developments.

Regarding the use of public participation and stakeholder consultation for an inclusive and transparent formulation of policy advice, our empirical survey shows that most EABs in Europe still function mainly as expert bodies rather than as hybrid forums. There are many deficiencies with regard to public participation in the work of EABs. Some of these problems are related to ambiguities regarding the position and role of stakeholders and citizens in the governance of science and technology, while others are related to the practical and theoretical limits of participative and deliberative democracy in such processes. Many new and emerging issues in science and technology are highly complex, requiring active scientific citizenship to achieve meaningful participation. The specificities of national political cultures and institutional traditions strongly influence the functioning of EABs.

While most EABs have not developed into hybrid platforms that fully foster the production of socially robust knowledge, an increase in the number of EABs with hybrid forum features is clearly visible. Nonetheless, the distribution of such features across EABs is very uneven. One highly advanced hybrid forum is the UK Nuffield Council on Bioethics, while many of the Eastern European EABs still function as entirely closed expert bodies.

It is likely that new EU policy strategies based on the idea of "responsible research and innovation" [81]: 9 will change the role of EABs. It is unclear yet which direction these changes will take. It could be argued that ethically acceptable, sustainable and socially desirable outcomes of innovation processes will only materialise if not only expert-based scientific risk assessments are conducted but also a wide variety of activities to incorporate consumer, stakeholder and broad societal interests into the quest for the common good and for the "right impacts" of emerging science and technology. Further transformations of institutionalised ethical policy advice will follow from these new ideas. Structural and functional changes to EABs could lead to a strengthening of Europe as a community based on shared values, as EABs do in fact represent a crucial pillar in the governance of new and emerging science and technology at national and European level. The transparency, plurality, inclusiveness and multi-disciplinary character of many EABs could, however, be further improved and expanded. On the other hand, EABs can only be one element of Europe's emerging new science and technology

governance architecture. A better use of synergies in policy advice activities regarding ethically contentious new and emerging science and technology appears desirable. This may lead to more systematic cooperation between EABs and other players and even to a redesign of the institutional landscape in this area of policy advice and public communication of science. At present, however, there is a risk that EABs will be overburdened by misplaced expectations; their further development therefore needs to take place in line with national political and institutional traditions and with the limits of their available resources in mind.

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