The Need to Rethink Human Enhancement Discourse

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Abstract

Today, we are encountering contradictory views on the recent and future progress of human enhancement technologies. It seems that the threats to the future progress of human enhancement technologies are still strongly rooted in our thinking. Very pessimistic or even dystopian views concerning future technological progress continue to be found in modern societies. In this article, some arguments are given for following a more pragmatic (not a dogmatic ideological) approach for assessing the implications of these technologies for future human and social life. Although the possible risks must be taken into consideration, we must not become a prisoner of the 'dogmatic philosophy of precautionism'. There is a need to support social and policy instruments (for example, the upstream engagement of scientific citizenship etc.) to create some kind of postmodern agora in which all dilemmas and questions of the human enhancement discourse will be discussed.

Introduction

In recent decades, radical advances in human enhancement technologies[1] have hinted at the possibility that we are on the edge of a further revolution, this time not only in relation to the natural world, but in relation to ourselves. For that reason, discussions concerning human enhancement technologies can no longer ignore the ways in which these technologies are actively shaped by social values, assumptions and social interests. Those theoretical positions which argue that technology is a value-neutral phenomenon are out of date. As Hans Jonas already argued, every technology is more than a mere value-neutral tool. It includes modes of transforming how we live and who we are. "Every technology touches on almost everything vital to man's existence – material, mental and spiritual" (Jonas 2010, 12).

These days, we are encountering contradictory views on the recent and future progress of human enhancement technologies. These opposing views are the result of conflicting values and social interests. James Hughes says that the technopolitical debates, which are increasingly occupying the political landscape of the 21st century will probably force further polarisation (Hughes 2006). In this polarisation, well-organised and politically connected technoconservatives still have a strong political influence. This means that very pessimistic or even dystopian views concerning future technological progress are still being held on to in theory and practice. These dystopian views are even leading to technophobia, a hate of technology which goes beyond a reasonable consideration of the negative effects of technological progress. They tend to present technology as the main evil of modern civilisation. The neo-primitivist technophobia as an extreme reaction to technological progress "can be compared to the disenchantment of early adulthood. One learns that attachments which are centered in romantic and erotic identification can frustrate growth and can generate suffering, pain, grief, and fear of loss" (Drengson 2010, 30). Such technophobia is usually based on technological determinism, understanding technology as a force that transforms the nature of human action. The question here is not what we can achieve with technology or how we can influence technological trajectories, but which kind of pressures technology puts on us.

In my discussion, I will take the opposite path. My assumption will be that we must overcome the (unproductive) conflict between techno-progressivists and technoconservatives if we are to understand technology not simply as something, which develops with a (deterministic) logic of its own, but something we can direct and control. A look back at past technological advances reveals that many earlier fears were deeply misguided or exaggerated. If we are to avoid repeating these errors, it is important that we put the debate about human enhancement technologies on the right track. In this sense, the most unproductive for understanding the complexity of modern human enhancement technologies are fixed ideological positions, which exaggerate the bipolarity of dystopian and utopian views. Human enhancement technologies must be primarily seen as the instrument to improve human and social life. Today, a number of

potentially valuable future applications for humankind are emerging from the processes of unifying the technologies that have progressed the most, i.e. biotechnology, nanotechnology, ICT and the cognitive sciences. These applications cover practically all areas of human life. I agree with the transhumanists' maxim that the future must be made by active and innovative humans who suppose that, regardless of how normal and successful an activity may be, there are always better ways of achieving the same ends, if not better versions of the same ends. Last but not least, even quite conservative moral philosophers such as Francis Fukuyama, who vehemently opposes the use of cognitive enhancement, nevertheless acknowledge, that "a society with higher average intelligence may be wealthier, insofar as productivity correlates with intelligence" (Fukuyama 2002, 97).

In my contribution, I shall first try to briefly highlight the importance of human enhancement technologies for the future development of modern liberal societies. As I will argue in the second subchapter of our article, greater support for the human enhancement discourse is needed in Europe. Here, the commitment to the doctrine of dogmatic precautionism is not the best way to go one step further in human enhancement. In the third subchapter, some broader aspects that determine the (non)acceptance of human enhancement technologies in the public sphere are presented. In the last part of my discussion, I argue that in the context of recent rethinking the public acceptance of human enhancement technologies, much more support must be given to the upstream engagement of scientific citizenship.

The importance of human enhancement technologies for the future development of modern liberal societies

Human enhancement technologies include a wide range of existing, emerging and envisioned technologies. The advances made in this broad spectrum of technologies are opening up the possibility of enhancing human capabilities beyond what is today considered 'average' or 'normal'. Because of this innovative effort, the potential applications of various human

enhancement technologies have already become a topic of controversial bioethical discussions (Agar 2013; Blackford 2013; Buchanan 2011; Savulescu & Bostrom 2009).

Obviously, human enhancement technologies in their supposed effects on society and individuals are a highly normative subject, involving a broad range of social and ethical controversies. In the centre of these ethical controversies one often finds questions such as whether a shift from "chance" to "choice" is allowable. For example, Juergen Habermas is strongly against a "free choice". According to him, in the name of a "free choice" modern biogenetic sciences can easily enter the field of eugenics via the backdoor. He wrote about the threat of the unethical use of preimplantation genetic tests (Habermas 2001). Such tests could trigger the development of liberal eugenics as a result of autonomous choices made by individuals through the application of such procedures rather than just as a request for therapy. As a result of these choices, liberal eugenics will not only affect the individual who makes the choice but also their interpersonal relationships. The procreators could thus become creators.

Contrary to Juergen Habermas, Steve Fuller states that a "free choice" is something positive. It is an expression of "moral entrepreneurship" (Fuller 2012). In his book "Humanity 2.0 – What it Means to be Human Past, Present and Future" (Fuller 2012), the proponents of moral entrepreneurship are described as future-oriented innovators who are paving the way towards the unknown territory of trans-human society. The crucial message of Fuller's arguments is that future-oriented innovators should be free to use different enhancement instruments to transform their cognitive and physical capabilities without any limits. This position is in accordance with the modern transhumanistic view. Namely, transhumanism is based on the belief that human enhancement technologies will enable the human race to transcend its biological limitations like death, age, disease and bodily constraints and that in the 'post-human age' these prophecies will be fulfilled. The main idea behind transhumanism is that the strategic interventions of the newly emerging technologies into both our reproductive capacity and nature's selection pressures would enable us to direct the course of the evolution of human beings.[2]

In the recent liberal and individualistically oriented societies, the justification of such libertarian views in terms of individual freedom to decide and pursue the transgression of 'normal' human physical and cognitive abilities appears to be no longer ethically contested. For example, the authors of NSF reports about new converging technologies also stated that human enhancement must be viewed as a basic human right in free democratic societies of the 21st century (Bainbridge & Roco 2006). "The people must have the right to enhance their memory, augment their intelligence, maximize their pleasure and even change their physical forms on demand" (Canton 2006, 43).

The need to support the progress of human enhancement technologies in Europe

Concerning the progress of human enhancement technologies it is very important to follow pragmatism because this way enables the avoidance of two unacceptable strategies: a total ban on one hand, or a laissez-faire approach on the other. The progress of human enhancement technologies should be pursued rather than inhibited. Such discourse is in line with the idea of a modern liberal society which should legalise and recognise different forms of lifestyles and bio-cultural capital. Unfortunately, the main problem is that both the opponents and proponents of human enhancement technologies employ rhetoric which is still full of ideological prejudices. In this situation it is often hard to elucidate rational arguments for or against the progress of human enhancement technologies. We need more realism and fewer ideological statements.

A more pragmatic approach concerning the human enhancement discourse is especially important for Europe. Namely, on one hand it is expected that advanced human enhancement technologies will be used in some parts of world in any event, regardless of what stance on human enhancement is taken in the Western part of the world. For example, the progress of human enhancement technologies is very attractive for China which according to many indicators is an undemocratic state.[3] On the other hand, in Europe there is increasing awareness that human enhance-

ment technologies can, in the short term, contribute to efficiency in the production of economic goals, but even much more to increases in human well-being. At present, the European "Zeitgeist" is strongly influenced by threats from various ecological, scientific and technological risks. The policy decision-makers in European countries are strongly inclined to see in the progress of human enhancement technologies the possibilities of unpredictable and negative consequences. Of course, none of these new technologies come without risks. Modern societies are risk societies. Ulrich Beck stated that in modern societies, the risk of scientific-technological progress is no longer confined to national borders, but is increasingly assuming a global dimension (Beck 1997). The global character of risk means that its regulation cannot be confined to national borders. Alternatively, as explained by Alan Irwin and Mike Michael: "Globalisation places new demands on scientific evidence and on the relationship between science and its risk management" (Irwin & Michael 2003, 46). However, although the possible risks must be taken into account, we must not become prisoners of the 'philosophy of precautionism'. Briefly summarized, the main point of the precautionary stance defended by policy decision-makers, precautionism is a policy programme which strongly emphasises caution and might even lead us to slow down or stop technological developments. Thus, precautionism places an enormous weight on the possible threat of future technological progress. Against this background, policy discussions sometimes tend to ignore that the framing of risk issues itself is also shaped by social values, assumptions and interests.

Due to Europe in the last decade having been confronted with a complex and challenging political and economic situation, opinions among various (not only economic) stakeholders that a third way between precautionary and proactionary principles must be found are ever more emerging. Namely, while the precautionary approach aims to prevent the worst possible outcomes, the proactionary one aims to promote the best available opportunities. That is to say, proactionary policy-makers believe in the intrinsic value of technological progress, so the assessment of risks should be limited to cases where evidence already exists for negative effects. In that sense, the new paradigm strongly propagated by the

European Commission of "responsible research and innovation" (Von Schomberg 2012) cannot be seen as part of precautionary thinking. Namely, it aims to shift the focus away from preventing risks and other potential negative implications of new and emerging technologies to the question of their "right impact" (Douglas & Stemerding 2013,140). Understood in this way, the EU paradigm of "responsible research and innovation" fits very well with the strategy of prudent vigilance suggested by U.S. R&D policy decision-makers. For example, in the last report of the U.S. Presidential Bioethics Commission on "new directions" in the ethics of synthetic biology and emerging technologies, the strategy of prudent vigilance is presented as an approach which fosters innovation and technological progress and at the same time strongly takes safety, security and environmental aspects, the values of people, and societal needs into account (PCSBI 2010).

In the future Europe, the legitimacy and desirability of the way seeking to find a better balance between the precautionary and proactionary principles will also depend on the institutional role of (bio)ethics as an instrument to improve the rationality and rationale of public decision-making in the domain of the new emerging technologies. Namely, the institutionalisation of (bio)ethics through various (national and international) ethics commissions and committees, i.e. expert ethics bodies with consultative and administrative functions, has produced a radical transformation of fundamental needs for a public ethics discourse in modern societies. While the role played by expert ethics bodies in modern policy- and decision-making has become indispensable, it is also a contested one. The increasing politicising of bioethics has recently been widely discussed in both the U.S. and European contexts. From a more conservative political stance, bioethicists as experts working on ethical advisory boards – while useful in questioning certain technological innovations – are seen exclusively as representing the interests of scientists and industry (Fukuyama 2002; Robert 2009). According to the conservative political view, they might be extremely instrumental in promoting the interests of specific stakeholders or, as Francis Fukuyama stated "they have become nothing more than sophisticated (and sophistic) justifiers of whatever it is the scientific community wants to do" (Fukuyama 2002,

156). On the other hand, according to liberal thinkers bioethics is seen as too conservative, especially when deriving their judgments from theologically-inspired backgrounds. Steve Fuller believes the recent debates in ethical advisory boards regarding human enhancement are still very strongly influenced by dogmatic moralising tendencies (Fuller 2012). Allen Buchanan criticises conservative bioethicists as substituting high-sounding rhetoric for reasoning, arguing that their opposition to the application of human enhancement technologies for the improvement of cognitive, physical and emotional capacities stems from their subordination to conservative dogmas (Buchanan 2011).

It seems that while many bioethicists generally strongly support, albeit not unconditionally, the progress of human enhancement technologies, many thinkers nevertheless often still tend to view them as impeding recent scientific and technological progress. There are some interesting results of my empirical research performed together with co-workers at The Center for Social Studies at the Faculty of Social Sciences (University of Ljubljana). In the context of an FP7 EU project entitled "Ethics in public policy-making: the case of human enhancement", me and my co-workers carried out an empirical investigation into which functions (bio)ethicists, whose professional backgrounds are usually dominated by philosophy and theology, perform in practice on national ethics committees (EPOCH 2011).[4] The national ethics committees rely heavily on ethical expert knowledge when dealing with the ever more complex challenges of technological progress. Considering that the remit of national ethics committees is primarily to examine the ethical and moral aspects of the new emerging sciences and technologies, it is not surprising that many of them confirm the active role of the bioethicists in these committees. Bioethicists in most interviewed national ethics committees perform a critical and supporting role concerning ethical issues of modern technology, in challenging the arguments and framing the language and discussion, as well as supporting other members in their reasoning. Such skills are often taught within the scope of traditional moral philosophy. As shown in the context of our EPOCH research, bioethicists in a smaller number of national ethics committees act as expert public relations persons, defending and justifying the decisions and recommendations of ethics

committees. Further, they provide legal advice only in a few national ethics committees and, given the membership background discussed above, such advice seems to be mostly left to members with a background in law. Finally, in a few national ethics committees bioethicists are emerging in the function of representing or engaging the public, which is also connected with the fact that there are mostly no mechanisms for engaging the public. Namely, as I will briefly point out at the end of my contribution, the current "participatory turn in scientific governance" (Braun & Kropp 2010, 774) and "democratic turn towards active citizen participation in science and technology" (Mejlgaard & Stares 2010, 545) is not yet reflected in the work of the surveyed national ethics committees since most of them do not employ any specific mechanisms for this purpose.

Conceptual challenges of the public human enhancement discourse

Although many social subjects nowadays share the idea that human enhancement is a basic right in democratic societies of the 21st century, the corresponding public discourse on the topic remains quite vague. In this situation, it is often hard to give an objective picture of the positive and negative effects of the progress of human enhancement technologies. For that reason, the need to highlight the broader epistemological and social context upon which the public discourse is based is continually appearing. However, this discourse is not straightforward. It is chiefly characterised by a lot of contradictions at the conceptual and social level. For example, the core conceptual challenge, at least as regards the social regulation of human enhancement technologies, emerges when we try to define the borders between human enhancement and human (medical) therapy. Is human enhancement merely a special case of human therapy? Does a strict distinction exist between human enhancement and human therapy? The answers to questions like these are by no means easy.

Contradictions are already arising from definitional issues. Let us take the example of synthetic biology, which, in recent times, has been one of the most dynamic sub-fields in the progress of human enhancement tech-

nologies. Synthetic biology means the use of advanced science and engineering to make or redesign living organisms so that they can carry out specific functions. It is a fascinating new subject of interest for the transhumanistic discourse because this new scientific field strives for complete control of the basic building blocks of life (Church & Regis 2012; Kastenhofer 2013). It is foreseen that some of the radical implications of synthetic biology for human and social life will soon be disseminated through society.

Although the most common definitions emphasise the building of new biological entities and improvements to the existing one, there is still no consensus even among experts as to whether synthetic biology is a game-changer or simply old wine in new bottles. Thus according to some views, synthetic biology is defined only as an extension of earlier practices in genetic engineering. This is based on the argument that all of the main techniques needed to conduct some form of synthetic biology were already existing in genetic engineering. However, according to others, synthetic biology is defined as a totally new research practice in relation to earlier practices of genetic engineering. According to Kelle, for instance, "[s]ynthetic biology clearly represents a scientific paradigm shift" (Kelle 2007, 4). To be precise, synthetic biology should not be equated with genetic engineering because synthetic biology brings a much greater requirement for DNA synthesis and concepts of rational design (orthogonality, hierarchies of abstraction, separation of design from manufacture, standardisation of interoperability). In the 1990s, a similar discussion regarding the field of nanotechnology took place: Although nanotechnology was then defined as one of the most promising and innovative niches of modern technology, it faced several controversies regarding the definition of its research activity (Barben et al. 2008; Uskokovic 2007). These controversies surrounding the basic definition of nanotechnology hold big implications for the definition of its risk governance.

On some occasions, synthetic biologists resort to 'double rhetoric' as a strategy to epistemologically 'normalise' the new research field. They use metaphors and images that connect new synthetic biology with older genetic engineering. The use of such a strategy is possible because all descriptive language, including scientific language, is ultimately meta-

phorical. In fact, such metaphors which draw an analogy between past and present research practice are in the initial stages heuristically productive. But, in later phases, they tend to lose their force because the new research practice becomes more consolidated.

However, the use of 'double rhetoric' by synthetic biologists serves not only epistemological reasons. The strategy of 'double rhetoric' is often used by synthetic biologists and policy actors to persuade an external audience that the new technology is reliable and under social control. This was already the case during the development of biotechnology (Liakopoulos 2002). For example, some researchers reported that when they tried to avoid eliciting an adverse reaction from the public they used various types of semantic "gymnastics", e.g. the recasting of the term "living organism" in synthetic biology in a "selfreplicating complex biological entity" (Schmidt et al. 2010). The second case relates to patent policy. At a time when there was great pressure to extend patentability from mechanical inventions to "biological artifacts", the American Office of Technology Assessment (OTA) published the "Patenting Life" report in which it stresses the analogy between mechanical (Mousetrap) and biological (Oncomouse) inventions. This analogy should again persuade the external audience that both inventions presumably share the same characteristics (Tallachini 2011).

The above-mentioned cases show that the public is becoming an important player in decisions by experts on how they will present the object of their research and based on this lay out regulation policy. In the event that synthetic biology is accepted in the wider public only as an incremental continuation of former genetic engineering, there would be no great pressure on expert and policy actors to start from scratch in regulation policy. For example, OECD experts assess that the risk issues appear to be the same in biotechnology dealing with GMOs as well as in the new field of synthetic biology, and expect that the multidisciplinary nature of synthetic biology creates a need for greater awareness and training of stakeholders who are new to the field, such as engineers unfamiliar with biosafety procedures or the growing body of amateur scientists to whom the field may be a mystery (OECD 2014, 27). Yet views are also presented that the risk assessment and risk governance of synthetic biology cannot

be based on well-established (legal and policy) routines. For example, at the end of 2014, three of the European Commission's expert bodies (Scientific Committee on Health and Environmental Risks, Scientific Committee on Emerging and Newly Identified Health Risks, Scientific Committee on Consumer Safety) prepared a preliminary opinion on the risk assessment and methodologies of synthetic biology (Scientific Committee's Opinion 2014). The opinion states that the acceleration of the genetic modification process by advances in synthetic genomics and DNA synthesis calls for more efficient procedures for risk assessment, especially where genetic modifications are introduced in a highly parallel manner.

The changing role of scientific citizenship in the human enhancement discourse

The social regulation of human enhancement technologies is intimately related to the problem of the role of the public in these processes. There is a need to establish a new model of "scientific citizenship" (Bucchi 2004, 14). Namely, the concept of scientific citizenship means a proactive stance of the public against new emerging technologies. As part of recent rethinking about public acceptance of human enhancement technologies, greater attention has to be paid not just to the issue of how to encourage citizens to participate in public debates on new emerging technologies, but also on how they should be more active in preparing the framework for their regulation.

In the science, technology and society literature, we often encounter three theoretical models describing citizens' participation in technology policy decision-making (Groboljsek & Mali 2012). In the autocratic model, decisions are made autocratically by political elites, without the provision of public information concerning their positive and negative impacts on society. In the information model, public information on technological governance is provided, but there is a lack of citizens' active engagement in the decision-making processes. Finally, in the democratic model, it is assumed that from the very beginning, citizens have the opportunity to be involved in technological decision-making processes that

shape the future progress of new emerging technologies. Demands to achieve a shift to the democratic model 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), but they are also substantial, supported by democratic theory.

We still lack theoretical approaches that might comprehensively describe the realm of the different participative processes of citizens in scientific matters. However, in reality crucial questions concerning the best forms of citizens' participation in scientific and technological matters are arising not so much on the theoretical as the practical level. Talking about scientific citizenship means that the biggest influence on technological policy regulation must come from organised representatives of citizens, rather than from an undifferentiated mass of consumers. Although citizenship is partly mediated through consumption in contemporary societies, consumer choice per se is not enough to become the key factor in the regulation of future scientific and technological progress. Consumers, construed as individuals or households, are determined only by their short-term economic interests.

In practice, different types of citizen participation have been formed. In the past two decades, we have witnessed the development of a variety of mechanisms to include the voices of lay citizens in R&D decision-making processes: focus groups, consensus conferences, citizens' juries, and so on. Each of these forms has their own characteristics, and there is not always necessarily a strong connection between them (Bowman & Hodge 2007; Kleinman et al. 2007; Kurath & Gisler 2009). The practical forms of participation range between two poles: from those that elicit an input in the form of opinions (e.g. public opinion surveys) to those that elicit judgments and decisions from which actual policy might be derived (e.g. consensus conferences).

What is absent in most European countries is the possibility of citizens engaging in more open dialogue with experts about risk and ethical aspects of new emerging technologies. Of course, I do not advocate the view that R&D policy- making processes be simply left to non-experts, but I believe that citizens should be assured a more open dialogue with

the experts. As expressed by many authors, democracy cannot dominate every domain – that would destroy expertise; and expertise cannot dominate every domain – that would destroy democracy (Collins & Evans 2007; Weingart 2001). Against this backdrop, older models of governance of new and emerging science and technology appear outmoded in today's society; i.e. the decisionist model assumed political governance to be truly and solely the responsibility of the political system, or, on the other end of the spectrum, the technocratic model tends to emphasise the omnipotence of experts as informal or even formal decision-makers (Mali et al. 2012).

Again looking at the results of the empirical research performed in the context of the FP7 EU project "Ethics in public policy-making: the case of human enhancement" (EPOCH 2014), it can be concluded that in national ethics committees, the voice of citizens regarding ethical oversight of human enhancement technologies is still poorly heard. Although in recent times some national ethics committees in Western European countries have started to develop mechanisms for engaging the external public so as to be included in their activities, such efforts are still at a very early stage of implementation. Further, it is unclear in what way and to what extent external actors and the public should be represented in the ethical and policy recommendations produced by these institutions.

Conclusion

In my contribution, I addressed some dilemmas of the continuing progress of human enhancement technologies. Even though many areas of human enhancement technologies are currently still at a very early stage of development, very concrete and realistic strategies to exploit their innovation potential must be worked out. Namely, the results of human enhancement technologies will have substantial and far-reaching impacts on modern society. It is impossible to predict all of the social and economic benefits of technological progress for human and social life. In this sense, it is assumed that this progress will change the basic understanding of the concept of human life. However, these long-range future visions reach

beyond recent human experiences with new technologies. For that reason, it would be of benefit to avoid unproductive ideological controversies about the future progress of human enhancement technologies in the public arena. Whilst the concerns on the advances in human enhancement technologies even in modern societies will by no means disappear, the question whether the commitment to the doctrine of dogmatic precautionism is justified nevertheless remains. I am sympathetic to the view that, if the progress of human enhancement abilities could be achieved with relatively few negative impacts on the individual and society, it would be irrational to oppose it. Of course, the role of citizens in public discussions about the future progress of human enhancement technologies must be strengthened. Citizens have to be mobilised and organised from the outset, before technological pathways become locked in.

Notes

1 In the understanding of this article, human enhancement technologies are not any specific technologies since potentially any newly emerging technology, which can be useful for this goal, is automatically a human enhancement technology. Notwithstanding this, it is primarily the rapid progress in the fields of nanotechnology, biotechnology, information technology and cognitive science that suggest ways in which modern technology could allow people to make themselves better than well by using human enhancements to transform what we regard to be human beings' species-typical functioning.

2 The term transhumanism goes back to Julian Huxley, who wrote in 1957: "The human species can, if it wishes, transcend itself – not just sporadically, an individual here in one way, an individual there in another way, but in its entirety, as humanity. We need a name for this new belief. Perhaps transhumanism will serve: man remaining man, but transcending himself, by realizing new possibilities of and for his human nature. 'I believe in transhumanism': once there are enough people who can truly say that, the human species will be on the threshold of a new kind of existence, as different from ours as ours is from that of Pekin man. It will at last be consciously fulfilling its real destiny" (Huxley 1957, 13-17).

3 In countries such as China, the political elites are aware of how important the progress of new technologies is for strengthening their own political power. The power and direction of new technologies in this case is entirely shaped by narrow political goals. Bill McKibben argues that China, due to its one-child policy in-

troduced in 1978, which officially restricts married, urban couples to a single child, while allowing exceptions in several cases, and impacting 36% of the population, might be especially interested in enhanced children (McKibben 2003).

4 The main goal of the EPOCH project (2011) was to provide a better insight into the role of ethics, and of ethical expertise in particular, in EU policies on science and technology. The project also investigated the development of European public policies on the topic of human enhancement and, more broadly, on the governance of contentious normative issues in science and technology. In the context of the project, an extensive semi-structured questionnaire asking about various aspects of the establishment, thematic orientations, internal functioning, policy-making impact, and the public relationship of individual national ethics committees was sent to 50 ethics committees in 32 European countries.

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