



Human Brain Project

European Citizens' View on Neuroscience and Dual Use

Synthesis Report of Citizen Workshops

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Summary

As part of the HBP citizen consultation on dual use, citizen workshops were carried out in 8 European countries, and a total of 241 European residents took part in this face-to-face consultation.

The research showed that the citizens were generally concerned about the HBP research and the potential uses that it could be put to.

The participating citizens were most frequently concerned about how these technological advances could lead to or be used for dehumanization of society, reduction of self-determination and free will, manipulation and political and social control and, lastly, privacy and surveillance. Central to this was that it was not the user that was primary to the participating citizens' concerns. Rather, it was the use itself. To them, dual use could also be beneficial. In addition, they considered PSIM use to be inevitable.

The overall conclusion of the face-to-face workshops was that the citizens, despite their concerns, were in favour of continuing neuroscience research even if it could have dual use, as long as it contributes to developing society, science and technology in a beneficial way. They generally considered the positive aspects of neuroscience research to outweigh the negative ones, and emphasized the potential benefits related to medicine, particularly in relation to medical treatment and diagnostics.

The citizens' support for continued neuroscience research was contingent on the development of international legislation and ethical guidelines for the research and use of neuroscience, and they suggested setting up a monitoring and enforcement body. To the citizens, policy-makers should play a central role in defining what neuroscience research and use is acceptable.



About the workshops

This report presents a synthesis of the results from citizen workshops carried out in Denmark, Germany, Italy, Portugal and Slovakia on the 25th November 2017, and in Lithuania, Malta, and UK on the 24th and 27th February, and the 3rd March 2018 respectively.

The focus of the workshops was the ethical, moral and practical questions that arise if neuroscience research intended for civilian use, as in the HBP project, can be used by others for political, security, intelligence or military purposes; dual use for short. Thus, the workshops sought to explore the opinions, values, hopes and worries of European citizens with regard to neuroscience research considering that it could have dual use.

The citizens were selected so the sample of citizens would reflect the demographic composition of the country with regard to age, gender, education, and area of residence.

Prior to the workshops all citizens received an information booklet, providing them with basic background information about the HBP, what areas of research HBP is engaged in, what dual use is and why it is relevant to discuss questions about dual use in context of a civilian neuroscience research project, as well as some examples of neuroscience research areas that could be applied for both civilian and military uses.

The full day workshops were divided into three rounds. During each of the rounds, the citizens were seated in predefined groups at tables with a moderator present at each table. A set of templates with questions for the citizens were used as a guide for the discussions at each table and as a reporting tool which the citizens were given the responsibility to fill out in collaboration.

In the first round, *Research and Dual Use – General Principles*, citizens discussed questions of a principal character regarding neuroscience research and the nuances that dual use adds to the research and the moral and ethical questions that it gives rise to. In the second round, *Potential Applications of Neuroscience Research*, the citizens discussed the possibilities and concerns regarding three areas that neuroscience research could be used for, both civilian and for political, security, intelligence and military (PSIM) purposes. For each of these areas the citizens had been given examples of how they could be applied for both civilian and military uses. In the third round, *Questions that need to be addressed in the future*, citizens were asked to formulate ethical, policy related or practical questions that need to be addressed in the future regarding neuroscience research and its possible dual use, and to decide whether it should be addressed by policy-makers, citizens, researchers or stakeholders. This was followed by a voting, where the citizens had to vote on the two questions at each table that they found most important. In order to see whether and how the opinions of the citizens had changed in the course of a day's discussions of the subject, the citizens were asked to fill out a questionnaire with four questions regarding neuroscience and dual use, when they arrived in the morning and at the end of the day.

The results from each of these consultations were gathered in a separate country report, all eight of which are included as annexes in this report. This report thus presents the main tendencies that occurred across the workshops, based on the information provided in each workshop's results report.



Results from Round 1 – Principles of Research and Dual Use

In the first round, the participating citizens discussed principal questions about neuroscience research and dual use hereof. They were asked five overall questions with three elaborating questions

The overall conclusion from the first round of discussions of the overall principles regarding neuroscience and dual use was that the citizens were in favour of neuroscience research being carried out, if it is of benefit to society. Generally speaking, if the research contributes to the progress of science, technology and society the citizens were in favour of it.

From the reports, it is clear that support was not unqualified for neuroscience research. Rather, the citizens seemed to consider it to be a more nuanced subject with both positive and negative aspects. Most of the citizens had general worries concerning illegal and uncontrolled use of the neuroscience research results and technology, either by military, states or other organisations and the fact that its use could not be predicted or controlled. The more specific examples of worries that recurred most across consultations were social and political control including manipulation of politicians and populations, and manipulation more generally as well. Another worry that citizens expressed, in continuation of manipulation and control, concerned increased mass surveillance.

It is noteworthy that the worries expressed by citizens were generally as much pertaining to abuse and misuse in general as it was to the dual use perspective. While it is important to point out, that the citizens in all countries found dual use of neuroscience to be worrying and problematic, the Danish, Portuguese, Slovakian, and Lithuanian citizens explicitly pointed out that the uses that concerned them had less to do with the user than the use itself.

A central message which was repeated time and again was that neuroscience research intended for civilian use would inevitably find military use, if military agencies wanted to make use of them. This was to an extent an expression of resignation on the part of the citizens. They expressed the sentiment that there is nothing that can be done to prevent the military from using this research if they want to. Further, the citizens felt convinced that it would not influence this development whether they were in favour of it or not would not. But it was also pointed out by the citizens in Denmark, Germany, Italy, Portugal, UK and Malta that dual use in itself was not a bad thing, and that it could in fact improve the research and provide benefits for civil society. The question as to whether it made a difference for citizens if the dual use of neuroscience was for defence or counter-terrorism purposes was among the most debated across almost all meetings, at times sparking heated debate. In most consultations it was argued that using counter-terrorism or defence purposes as justification is a slippery slope and that counter-terrorism easily leads to pre-emption and the like.

An almost categorical request from citizens at all consultations, a request that was repeated throughout the rounds, was that it is imperative and indispensable to establish rules for neuroscience research, development and use, both in relation to civilian research and use, as well as dual use research and use. The citizens found it as a necessary precondition in order to favour further neuroscience research as well as

for any cooperation and funding activities. These regulations should be international in scope and consist of a framework of ethical guidelines of what is acceptable as well as rules stipulating what is good and ethical neuroscience research and subsequent use of results. These could take the form of conventions or treaties. It was suggested that to ensure compliance with and potentially enforcement of these rules a supervisory or monitoring body should be established, which could continuously monitor ethical issues and ensure that research, development and use is kept within acceptable limits.

To the citizens at the German, Italian and Slovakian consultations it was seen as important that neuroscience results were published, regardless of the potential for dual use. They argued that transparency should prevail; information should not be hidden, it should be made available for the public.

The question as to whether HBP should cooperate with other organisations or brain initiatives, like the *American Brain Initiative* or the *China Brain Project*, caused a lot of discussion at some workshops. It was not seen as entirely unproblematic. However, the citizens in all countries except Germany argued that such cooperation could be acceptable. One argument for such cooperation was that it would create the best conditions for furthering the research and that it could give societal influence on how military research funds were spent. A recurrent precondition for conducting this research was that it was necessary to ensure that military and civilian research was kept separate. The citizens at the German consultation were opposed to such cooperation, providing an argument that was also echoed at the other consultations; that such cooperation could create a conflict of interests and that there would be a certain financial dependency. This general picture is confirmed by the responses to the questionnaire, where 32% answered that such cooperation should be allowed because the most important thing is to make progress in the research, while 35% answered that it should be allowed if the partner was based in a country that has signed relevant international treaties, on e.g. chemical or biological weapons, while only 19% were against any such collaboration.

An unmotivated response to this question, that appeared several times, was that more funding should be made available for civilian research and that military research should not be a priority.

Also the question on whether HBP should provide funding for research in organisations that also conduct military research was subject to much dispute. While the citizens at the Danish and Slovakian consultations argued that there would be no fundamental issue of such funding, the Italian citizens were generally against it. The citizens at the German, Portuguese, British, Lithuanian, and Maltese meetings were divided, providing both arguments for and against.

So while clearly not being unconcerned about dual use of neuroscience research, the citizens were still in favour of continuing it. Their worries were both for state and military dual use, but also illegal and uncontrolled use by other organisations. This was further underlined at four of the consultations where the citizens emphasized that their concern was more with how it was used, than with who uses it, which was also to say that military use could be acceptable. In addition, they found that dual use was inevitable, regardless what anyone did, the military or other PSIM organisations would make use of it, if they found it relevant to do so.

The citizens at all consultations emphasized that support for continued neuroscience research was contingent on the establishment of international rules for the research as well as its development and use, containing, among other things, ethical guidelines for what is acceptable.



Results from Round 2 – Potential Applications of Neuroscience Research

In the second round, citizens were presented with three examples of research areas: medicine, artificial intelligence (computer learning), and Brain-computer interfaces. They were asked to discuss the possibilities and concerns for both civilian and military uses for each of the three examples, as well as to point to the dilemmas they saw concerning the research and its use, and were presented with some examples of what these civilian and PSIM uses could be.

Medicine

As an overall conclusion, the citizens considered the research examples they were presented with concerning neuroscience developments in medicine to be predominantly positive. In Denmark, Italy, Portugal, Slovakia, Lithuania, and Malta citizens generally agreed that the positive aspects outweighed the negative ones, whereas the German and British citizens were more divided. The civilian applications, though not considered to be unequivocally positive, were generally more accepted than the military ones.

When discussing the positive aspects there were particularly two overall themes that the citizens brought up. The first concerned the ability to improve treatments, especially via new medications. Here there tended to be much focus on treatment of brain diseases and mental ailments. Also more medication that was more accurate, efficient and maybe able to treat hitherto untreatable diseases and afflictions were high on the list, as was the hope of medicines that produced fewer side-effects. The other focus was on improvements to diagnoses, particularly making more precise diagnoses and doing so at much earlier stages. These themes were shared across all eight consultations.

Despite their endorsement for this research, citizens still had worries. When asked at the tables to determine whether they were concerned about the research, the majority of tables at the consultations in Germany, Italy, Portugal, Slovakia, UK, and Malta answered yes.

This was also evident in that the citizens at most consultations had a tendency to list more worries than hopes when it came to medicine, despite their support for the research.

There were worries that appeared frequently across the different consultations. Primarily there was great concern among many citizens about how new developments in medication would affect the societal perceptions of what is normal. There were several groups that mentioned fears relating to suppressing and treating as pathological, feelings, emotions and reactions that are essentially natural. In this vein, there were widespread worries about a streamlining and homogenization of society and a standardisation of behaviour through medication. This was also connected to a fear about how this would affect the individual's self-determination and identity. Also the perspective of creating less sensitive or empathetic people through medication, both for military and civilian purposes, was recurrent. There were also widespread concerns about how these drugs could be used to increase productivity and efficiency, making proper working machines of human beings, as one group wrote: "in the name of efficiency, people become inhuman".



These worries could be summed up as a fear of getting out of touch with humanness and human nature, or a dehumanization of society.

Another central worry that appeared across several of the consultations was related to the intentions behind the research and exploitation of its results. There were particularly worries about how interests of powerful pharmaceutical companies could influence the dissemination and uptake of such drugs. For instance, that they would be able to influence what should be treated with drugs and what should not. In continuation of both of these general fears, was the fear of manipulation of people and the mind, which was a common theme and the use of newly developed drugs to control people.

There were two general categories of dilemmas that recurred across consultations. One concerned the dilemma that consists in distinguishing good and beneficial treatment from bad. There were widespread concerns about the tendency of medication being used for enhancement of otherwise normally functioning physical and mental capacities, rather than treatment of mental or physical ailments, and how increasing use of medication for enhancement could change the societal understanding of what is normal and what can be expected. So the dilemma pertains to the issue of distinguishing between when it is beneficial to use these drugs, and when it negatively affects the understanding of normality in society.

The second recurrent dilemma was that medicine and medical treatments generally can be used for both benign and maleficent purposes in both military and civilian contexts, so how can the intended use be ensured and who is to determine what this is? A third dilemma concerned the issue of equality of access to new medicines and whether new expensive medicines would exacerbate social inequalities.

Generally comments from the tables indicated that what was most important to citizens was that the central aspiration of the development of medicine should be to foster a better quality of life. Of the three example areas, medicine appeared to be the least controversial to citizens. It is also worth noting, that worries specifically about dual use were very infrequent in discussions on this research area. As in the first round, concerns tended to focus more on how these developments were put to use and how it would affect society, than on who uses them, with the exception of worries about powerful pharmaceutical companies.

It is interesting to note that the positive aspects emphasized at the different workshops tended to be civilian, though there were some related to soldiers, notably in relation to treatment of post-traumatic stress syndrome. However, the negative aspects that were recurrent were also typically related to civilian uses, though particularly 'combat'-drugs were often seen as negative. In general, it seemed that the civilian applications were generally more often the focus of the citizens' discussions, but they were also found to be more acceptable, though there were also considerable concerns about some of these. For the military use, it was primarily post-action treatment that was acceptable, e.g. treatment of post-traumatic stress syndrome, whereas using drugs in to enhance capacities of soldiers was not seen as acceptable.

Artificial intelligence (computer learning)

As an overall consideration, the citizens were less decidedly positive about artificial intelligence, than they were about medicine. Both the positive and the negative aspects tended to have focus on both civilian and



PSIM uses, and were often part of discussions that seamlessly involved both. As such, whether the use was civilian or PSIM was not a defining parameter in terms of its acceptability to participants.

Seen across all eight consultations, the citizens were less certain whether the potential positive aspects of artificial intelligence outweighed the negative ones, than they were regarding medicine. In Italy, Denmark, UK, and Malta there were as many to whom the positive outweighed the negative, as the other way around, while the Slovakian, Portuguese, and Lithuania citizens considered the positive to have greatest weight, and the German citizens considered the negative to outweigh the positive, commenting that the positive potentials were trivial compared to the risks.

When discussing what positive aspects they saw in the developments of artificial intelligence, there were three main themes. The first was that artificial intelligence could make life more comfortable and simple. It could create more spare time because more jobs and tasks can be handled automatically. This would create a safer working life and a more comfortable home life.

In continuation hereof, a general theme was improvement of security and safety, both because of some dangerous jobs could be handled by machines, but also because increased use of machines could reduce risks related to human error. The last recurrent theme across most of the consultations was that artificial intelligence could be of benefit in health and medical issues, especially in terms of treatment and diagnosis.

To the question of whether they were concerned that this kind of research and development was being carried out, the Italian and Slovakian citizens were more or less in agreement that they were concerned, while the sentiment among the Portuguese, German, Danish, British, Lithuanian, and Maltese citizens was much less clear. Some were concerned; others weren't, while still others answered both yes and no.

When considering the negative aspects that were written down by the citizens, there were some themes and worries that were central across all or most of the consultations.

Something that was perceived as a negative aspect, which was central across almost all workshops, was the way artificial intelligence would affect privacy. This was often also connected with the concerns about how artificial intelligence would enable much more pervasive and in-depth surveillance, because it would be able to usefully handle and analyse very large and complex sets of data, making surveillance much more widespread, precise, efficient and effective.

Another related worry that appeared across several of the consultations, concerned control of artificial intelligence. This was mentioned at the Danish, German, Italian, Slovakian, and Lithuanian consultations, where the citizens were not confident about the ability to understand and control this technology in the long run, and they feared that it could develop to a degree where it was out of or beyond control, for instance that systems driven by artificial intelligence start making decisions that the controllers are unable to account for or understand, leading to a situation where the systems are functionally out of control. Another example was that systems driven by artificial intelligence can be used by corporations, military or governments to deliberately manipulate information and influence decision-makers and populations or even control these. In this vein, several citizens emphasized the importance of programming and thus the programmer, and the accountability of the organisations employing these systems.



Another frequently emphasized worry was that our societies are developing an overreliance on technology and computer systems, and that such overreliance naturally increases vulnerability if systems run out of control or are used maliciously. But the citizens also emphasized two other problematic aspects of increased reliance on technology. In Portugal, Germany, Slovakia, and UK there were widespread worries among the citizens about what the consequences will be when computers start taking over more tasks and being essential aspects in decision making processes, both in terms of information repositories and as analytical tools. If we start relying on machines to remember things for us and to fulfil tasks that we as a species spent millennia refining the skills for. And when we rely on machines to make analysis and provide suggestions for action, what will happen to the individual's capacity for independent and critical thinking and our abilities as a species to manage these tasks? At several of the consultations, this also concerned skills for social interaction, being influenced and possibly deteriorating as a consequence of increased mediation of interaction. A formulation, the essence of which was repeated at all four of these consultations, captures the meaning well: the smarter machines become, the more stupid people will be.

In continuation of this, there were worries regarding how this would influence free will. If machines think for us or do large part of the analytical work for us, will we be able to think for ourselves? Will we still have a free will? Likewise, the citizens worried about increase in machine generated suggestions would influence choices and decision-making. When we rely on machines for finding information, for shopping etc. how can we know that what we end up doing or buying is what we want, and not something that we have been convinced that we want?

The citizens also frequently worried that the increased automation will lead to an equivalent increase in unemployment and what that would mean for the welfare systems when robots work and people are unemployed and unable to pay taxes.

The second aspect pertains to what was called *dehumanization* by the citizens at the German, Italian, Portuguese, and Slovakian consultations, and was a central theme at all consultations. They worried that the increasing use, importance and reliance on computer systems driven by artificial intelligence would negatively influence the humanness of society. To the citizens, there was a great danger that a society where decisions are driven or made by computer-based calculations and algorithms there will be much more efficient and cost-effective, but that it will also be an unempathetic society with little tolerance for emotions and humane 'inefficiency'. They are concerned about how a society run by or at least heavily influenced by non-empathetic and potentially intelligently superior and incomprehensible computers will look like, and what will be the place of humans in it. It was frequently mentioned that this development would increase standardization and categorisation of people, creating a reductionist society where people are increasingly defined by the categories that they have been assigned. This also relates to the aforementioned fear of reduction of free will and the ability to think critically and independently. The citizens, as expressed by one group, feared that this development could lead to them losing their humanity.

In answering what dilemmas they saw for the research and its potential use, the answers were in natural continuation of the citizens' worries and were in particular focused on two themes. The first concerned the balance of power between humans and machines, and related much to the worries that the citizens expressed regarding overreliance on machines. This was a central dilemma among citizens at the Danish, Italian, Portuguese, and Lithuanian consultations, and could be summed up by the question posed in

Portugal, asking how to establish a balanced power relation between human and machine. Can we stop the machines if they turn out to pose a threat to us?

The second theme among the dilemmas addressed the questions of ethics and responsibility in this development. While they were often phrased as difficult questions to solve, rather than dilemmas, they generally had to do with how machines that essentially works according to binary logics can be taught ethics and moral values which are never binary or deterministic. In continuation hereof, citizens were wondering how responsibility for these systems and machines being operated by them could be assigned. While there was not much explicit mention of worries directly linked to PSIM use, it was latent in many of the examples provided by citizens. Like in the first round, there was mention at several consultations of the requirement of establishing international regulation of research in this area.

Generally the citizens were more ambiguous with regard to their support of this research area. At most of the consultations, the sentiment was mixed, and while they were did find some aspects which they found to be positive, these were fewer and there was less agreement on them across consultations than was the case with the negative aspects. The negative aspects that recurred across consultations particularly concerned overreliance on computers and the ability to control and understand AI, as well as dehumanization, including worries that AI could negatively affect free will and critical thinking.

Looking at how the citizens conceived of the division between civilian and PSIM use, it is clear that this was not the primary factor deciding whether they found use acceptable. They found use of AI for political manipulation unacceptable, but they were also concerned that it would lead to general inability to make independent decisions in civil society contexts. And when they were concerned about surveillance, it was not just governmental surveillance, but also private corporations gathering vast amounts of information about them.

Brain-computer interfaces

As with artificial intelligence, there was not a clear answer to whether the citizens considered the positive aspects of brain-computer interfaces to outweigh the negative ones, however it appears that there might be a slight tendency that they overall agree, as 15 of the 41 tables across all consultations answered both 'yes' and 'no' and 20 answered 'yes', while only 6 tables answered 'no'. As with AI, the citizens did not seem to use the civilian – PSIM division to distinguish what uses were considered acceptable or unacceptable. While the positive aspects tended to be related to health and quality of life, and to some degree be more focused on civilian applications, the negative aspects focused on both civilian and PSIM uses.

When listing the positive potentials of brain-computer interfaces, the citizens tended to focus on two overall themes. The first and most central theme that occurred across all of the consultations was the potentials that brain-computer interfaces could have for improving life and living conditions. The technology was especially seen as relevant for helping disabled people and people who were paralyzed. The perspective of robotic limbs for amputees and exoskeletons for paralyzed or disabled people was seen as some of the major benefits, as well as the potential for helping blind or deaf people gain or regain their senses. This was seen as a way of improving their standard of living.

The second theme, which was central at the Danish, German, Italian, Lithuanian, and Maltese consultations, was that this technology could be a positive development within medical applications, and



especially the potential to use this technology to gain a better understanding of the brain and how to treat different mental and neurological ailments was seen as promising.

There was no doubt among most of the citizens that they were concerned about this kind of research being carried out. This was the case at all tables at the Italian consultation and a clear majority at the Portuguese, German, Slovakian, British, Lithuanian, and Maltese consultations, while the Danish citizens were 'critically supportive' as one group put it.

When asked to be more specific about what they worried about, there were particularly three aspects that recurred across the consultations. Firstly, it was a central concern to the citizens at all the consultations that this technology could be used for manipulation of and exercising control over people, especially in relation to 'editing' or influencing memories and brain washing. Also the risk of this type of technology being used to modify behaviour concerned the citizens.

The second theme concerned issues of privacy and data protection. The citizens were concerned about how interfaces that connect the brain to a computer can be made consistent with privacy. Across all consultations, the citizens emphasized that if it becomes commonplace to connect computers to the brain via invasive or wearable interfaces, they were worried that privacy was a thing of the past. If these technologies become sufficiently sophisticated and can start 'reading' thoughts, there will be a new type of data that is sensitive in a much more fundamental way, than any data hitherto generated. They worried that this data could also be exploited or used for surveillance. This made the issue of data protection even more pertinent to the citizens, than it already is, since the very most private thoughts and opinions could potentially be accessible via computers that are susceptible to hacking and other malicious intrusion. This also follows in the vein of the first point about manipulation, since such hacking could potentially also be used to influence the person with the chip or wearable.

The third aspect of this technology that worried citizens across all eight meetings, was dehumanization, echoing the worries that citizens voiced concerning artificial intelligence. The worries regarding the dehumanizing effects of brain-computer interfaces focused on how such technology would affect identity and free will. At all consultations it was a central theme that brain-computer interfaces could create a loss of the human identity and of free will, because computers become integrated in the centre of what makes us human. To the citizens, it could risk leading to a situation where humans become something else, a cyborg or hybrid being. There was concern that this would lead to an increase in standardization and homogenization, and a loss of self-determination, and that, in the words of one group, would risk removing us from what makes us human. This also included worries about how it would affect emotions and feelings and that it could lead to a distorted view of what is normal and healthy.

The dilemmas that brain-computer interfaces could cause, according to the citizens, were more scattered, than was the case for the two previous example research areas. Most of the dilemmas occurred at only one or two of the consultations. There was one theme which occurred at both the Danish, Italian, German, Portuguese, and Lithuanian consultations, which concerned the balance between whether the use of brain-computer interfaces constitutes an improvement or whether it is going too far. This could be summed up in the question posed by one group: should we improve people just because we can?

While the citizens did find some positive aspects pertaining to BCI, particularly its ability to improve living conditions and in medical practices, they were generally also concerned about it. Their worries centred on



manipulation and mind control, privacy and data protection and dehumanization. It is noteworthy that military use was mentioned explicitly more frequently by citizens when discussing this research area than at any other point, and frequently it was mentioned as a positive thing, particularly in relation to soldiers that have lost limbs or for treating PTSD.

Cross-cutting

Between the three examples of research areas, it was clearly medicine which had the most support in itself, which is further underlined by medical uses being cited as some of the positive aspects of the two other research areas. There was generally mixed feelings about the other two research areas.

As mentioned above, the primary recurrent positive aspect across the three themes was use of this research for medical and health improvement purposes, in relation to treatment and diagnostics.

In the discussions of all three examples it transpired that the respondents were not first and foremost concerned about whether the use that the research was put to was civilian or PSIM. It was clear that they generally saw positive and negative aspects about both, and that this parameter was not decisive for them. It was about the use itself, not who is using it.

Across all three topics, citizens were concerned about dehumanization, and privacy and data protection was a central topic in two of the research areas, as was worries about how it would influence free will and critical thinking as well as the potential for using it to manipulate and exercise political and social control. It is worth noting that in none of these example areas, is dual use the primary preoccupation. They are worried about it, but the majority of worries that they list has just as much to do with civilian use and are just as much worries about the developments in technology and research in general. This again emphasizes the point made by the respondents in the first round, that their concerns were less to do with whether the military or other PSIM organisations used the research results, but rather with how it is used.

The dilemma that occurred across the three rounds focused the difficulty in determining how to use these technologies. More specifically, they posed the question of how to determine what use is apposite and necessary and which is unnecessary or even harmful, and just as much who is to determine this.

	Do the positive aspects of this technology outweigh the negative ones?			Are you concerned that this research is being carried out?		
	Brain-computer interfaces	Artificial intelligence	Medicine	Brain-computer interfaces	Artificial intelligence	Medicine
Yes	20	14	19	21	20	17
No	6	3	2	5	6	12
Yes and no	15	12	8	11	10	8
Equal weight	-	6	6	-	-	-
Do not know	-	4	6	4	3	4



The above matrix is interesting when considering it in relation to the first question on the questionnaire, which asked whether citizens were concerned about dual use of HBP research. While the citizens generally find the positive aspects of the three technologies to outweigh the negative ones, more so for BCI and medicine than for AI, they are generally concerned about the research being carried out. From this, and the above it seems that while the citizens are concerned about the research and its potential risks, they are still positively inclined to the technologies that come out of it, and that there is support for the research, albeit a conditioned support.



Results from Round 3 – Questions to address in the future

In the third round, the citizens had to formulate questions or themes related to HBP or research that could have dual use that they found it important for HBP, policy makers, researchers, stakeholders or citizens to address and discuss in the future. Subsequently, the citizens at the consultations voted on the questions that they considered to be the most important at their consultation.

There was a very general tendency among the citizens to direct their questions at policy makers. Across all workshops, 189 questions were directed at policy-makers, while researchers were the target of 165 questions. Stakeholders and citizens received considerably fewer questions, with 105 and 99, respectively. The same was the case when considering the questions that received the most votes. Combining the top 10 questions from all eight citizen workshops, 50 questions were directed at policymakers, while only 31 were directed at researchers, 18 at stakeholders and 17 at citizens.

This is logically consistent with the tendency of citizens to emphasize legislative frameworks with ethical guidelines.

The top ten questions from the different workshops very often focus on how to prevent abuse and malicious use of research. And generally these are aimed at policy makers, which clearly underlines the tendency that has also been visible hitherto, that this is an area where the citizens want the policy makers to make regulations and ethical guidelines for neuroscience research. It was also clear from the questions, that the citizens did not want it be up to the scientists' ethical and moral compasses to determine what research and innovation should be carried through. Many of these questions also concerned whether it would be possible to identify risks, which it seemed that citizens did not believe to be possible, and how projects such as HBP was going to address risks that were hard to identify a priori. This is fact was subject of far most of the questions, in one way or another. How to manage risks, safeguard the public, avoid malicious use and develop legislation that could do this which includes ethical considerations that can be applied in so different cultural contexts as is necessary. The last point is central to the citizens, as they see this as not being just a national or regional issue. At the very least this requires a cross-European and preferably an international piece of legislation. Another theme that elaborates on this was centred around the issue of who is to decide what is acceptable and what is unacceptable use, respectively. This, it seemed, the citizens found to be a central issue, not least because of the international scope of the regulation that they would like.

The topic of international regulation should also be seen in the light of many of the other questions being concerned with the risk of abuse of the research, either by PSIM or other organisations, or even the worries that were expressed in several consultations, that AI technology could turn against humanity. More immediate worries in this regard frequently concerned how to prevent that humans are abused and are able to remain themselves or to retain their ability to be self-determining, reflective and independent beings. An illustrative quote was provided by one citizen who asked: "Robot or human? What can I do if I want to remain a free person with my feelings not influenced by computers?"



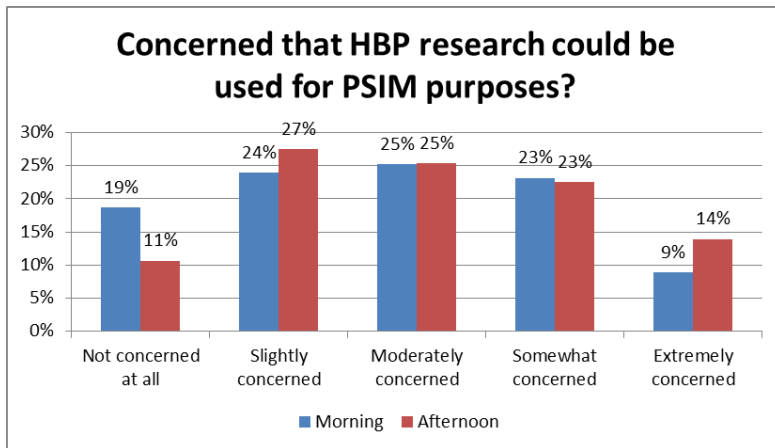
It should also be seen context of citizens wanting to know what the values for development and use of the technology, science and innovations should be. At several workshops a popular question was what interests or purpose should form the background of developing the research. Should it be for economic, social or other purposes? And who should decide this?

Particularly the last aspect also found expression in another topic that the questions frequently addressed, which was that the citizens would like to be involved in these processes. The citizens call for public engagement processes around the technological innovations, even to the point of having participation in the definition of research funding. On top of that, a frequent request was that projects like HBP take efforts to educate and inform the public about the technological advances. In this vein, they further advocate for transparency about what research is going on and publicly available publications about research results. These questions were particularly addressed at policy makers.

It is thus also clear from the content of the questions that the citizens were calling for action from policy-makers. Policy makers in this context should both be understood as politicians, but also the policy makers that decide research funding frameworks and allocation. As written above, the citizens did not find it desirable that the ethical decisions and monitoring that according to them need to made, should be made by the researchers involved themselves.



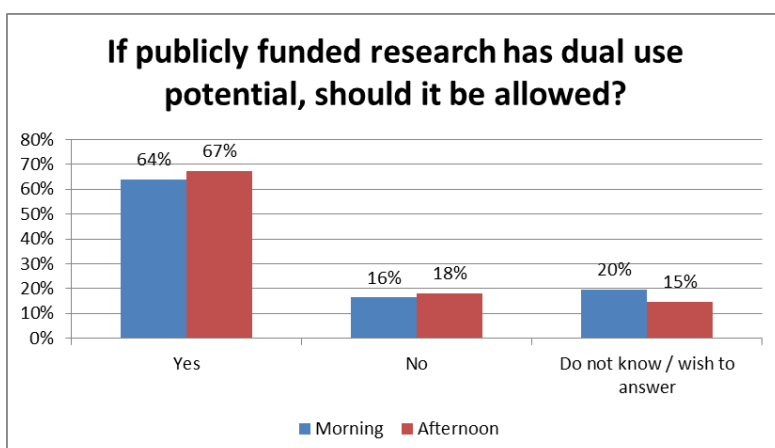
Results from questionnaires



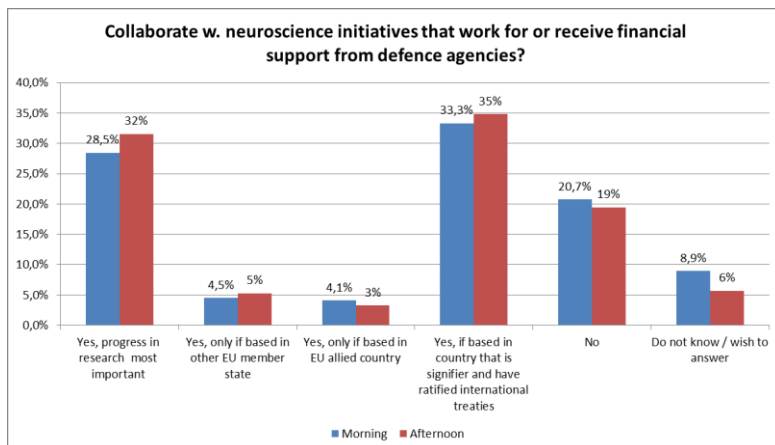
As part of the workshops, the citizens were asked to fill out a questionnaire concerning their attitudes and values regarding neuroscience and questions related to dual use before the workshops began. In order to see if the citizens had changed their opinions in the course of a days' deliberation, they were asked to fill out the same questionnaire at the end of the day.

The answers to question 1, as to whether the citizens are concerned about HBP research being used by others for dual use purposes, a slight development can be detected between morning and afternoon. In the morning, the citizens were more or less evenly divided between being not at all concerned to being somewhat concerned, while fewest were extremely concerned, thus leaning slightly more to the less concerned end of the scale. In the afternoon, however, the leaning had shifted to the higher part of the scale, i.e. more concerned. This tendency is driven in particular by the citizens in Italy, Germany, UK, Lithuania, and Slovakia, while the opposite is true for Denmark, where there is a gradual shift to being less worried, while Portugal and Malta have little development.

Question 2 asked whether publicly funded research that could have dual use should be allowed. Here there is a clear tendency to greater acceptance of such scenario at the end of the day. In the morning 64% answered yes, while 67% did the same thing in the afternoon, whereas 16% and 18% answered no in the morning and afternoon, respectively. The biggest contributor to the increase in citizens answering 'Yes' seems to come from the 20% that answered 'Do not know' in the morning, since there was only 15% that answered this in the afternoon. This development was particularly evident in Portugal, Slovakia, and England and to a lesser extent in Denmark. The German, Lithuanian and Maltese citizens, on the other hand, had the opposite development. There was no development among the Italian citizens.



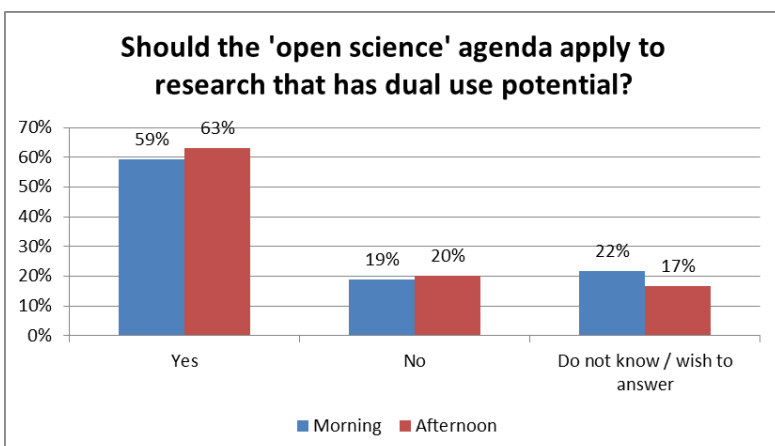
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Question 3 concerned whether HBP should cooperate with other research organisations or initiatives that work for or receive support from defence agencies. Here there was a tendency to increasingly accept such cooperation. In the morning 29% percent answered 'yes, the most important thing is to make progress in research', while that same answered received 32% of citizens' votes in the afternoon. The

answer receiving the most votes, both in the morning (33%) and the afternoon (35%) was 'Yes, but only initiatives or organisations in countries, that have signed and ratified international treaties on e.g. chemical or biological weapons'. At the same time, the amount of citizens rejecting such participation fell from 21% in the morning to 19% in the afternoon. This development can be detected in both Denmark, Slovakia, Italy, Malta, and Lithuania, while Portugal saw an increase in people unconditionally answering yes, but at the same time a drop in those answering 'yes, but only initiatives or organisations in countries, that have signed and ratified international treaties on e.g. chemical or biological weapons' and an increase among those who answered 'no'. In Germany and UK, there was a decrease in those answering 'd' and a corresponding increase in those answering 'no', while there was also an increase in the citizens that unconditionally supported such collaboration in the UK.

The last question asked whether the European Commission's focus on open science should be maintained for research with potential dual use. Here the tendency was clearly that of greater acceptance between the morning and the afternoon. In the morning 59% answered yes, while this was the case for 63% in the afternoon. Correspondingly, the amount answering 'no' fell from 22% to 17%. This tendency was driven by Denmark, Italy, Portugal, and Lithuania that all had similar developments, while in particular Slovakia, but also Germany and Malta, had the opposite development. In the English consultation both yes and no rose by two. This was an even stronger expression than the results from the reports, which show that at some workshops citizens found it important that neuroscience results were published, regardless of its potential for dual use.



It seems that the more time the citizens spent discussing and learning about the perspectives of dual use of neuroscience research the more concerned they become about its possible dual use, but at the same time they become more accepting of the research as such and they also become more accepting of collaboration with organisations financially related to defence agencies. While this



development does appear counter-intuitive on its own, in the light of the previous analysis it is clear that this is an expression of a more general sentiment that, the citizens are worried about this research and the technological innovations that can be developed from it, but at the same time they consider it to be more positive than negative and that the trade-off between risks and benefits is good enough that they will accept it.

Another note is that, a consistent tendency across the three questions where it was an option, has been for the amount of people answering 'do not know / wish to answer' to drop. This indicates that, if nothing else, the consultations help inform people about the research and its positive and negative potentials and to assist them in making up their minds.

That the citizens did change their opinion in the course of the day goes to show, that physical consultations provide more than in-depth knowledge of citizens' opinions. It also provides an opportunity for citizens to influence each other and create a deeper nuance of their opinions.

It shows that the advantage of face to face consultations is not just the rich and detailed output, but also that citizens are forced to discuss and develop and elaborate their own stances, so that the output is also the result of mutual influence among citizens, including the joining of perspectives.



Conclusions

The overall conclusion from the face to face consultations was that, though the citizens were worried about the possibility that results of neuroscience research might have dual use, they were nevertheless in favour of continuing the developments in neuroscience research. To the citizens, as long as the research contributes to developing society, science and technology in a beneficial way, they were in favour of it. During the consultations, citizens were presented with three examples of research and use areas for neuroscience (medicine, brain-computer interfaces and artificial intelligence), and when asked whether the positive potentials for these outweighed the negative ones. The answer was very clearly 'yes' for medicine, while brain-computer interface and artificial intelligence was more disputed.

In all three rounds it transpired that the respondents were not first and foremost concerned about whether the use that the research was put to was civilian or PSIM. It was clear that they generally saw positive and negative aspects about both, but that this parameter was not decisive for them. As such, whether the use was civilian or PSIM was not a defining parameter in terms of its acceptability to participants. It was about the use itself, not who is using it.

Across the different rounds of the consultations, it was in particular the perspective of improving treatments and diagnostic capabilities that the citizens highlighted as the major positive potentials of neuroscience. In this context it was to a large extent improved understanding and treatment of mental ailments and neurotic disorders that citizens emphasized, as well as improved ability to help disabled and paralyzed people.

While the citizens, as shown, were positively inclined to neuroscience research, this should not be taken to mean that they did not have any concerns about it. On the contrary, when asked about whether they found the research and development in the three research example areas worrying, the answer was a very clear yes, across all three examples and all eight consultations. It is also symptomatic of this, that when asked whether they thought of research with dual use as problematic or reassuring, they tended to focus much more on the aspects they found worrying and problematic.

There were some general worries that the citizens tended to return to across rounds and consultations. The citizens were very worried that the scientific and technological developments resulting from neuroscience research could lead to a dehumanisation of society, which was to say that they saw a risk that these developments could create a new understanding of what is normal and that essential aspects of the human nature, e.g. emotions, feelings or senses, would risk being suppressed or amplified, creating a non-empathetic society. In addition, they were worried that these technological developments could lead to a homogenization of society where behaviour is streamlined and everything is standardized. Generally it was feared that societies that increasingly rely on computers, will start adopting the logic and functioning of computers, underpinning or enforcing this by using different forms of stimulants or stimulating mechanisms.

In continuation hereof, there were widespread concerns about how these developments would affect the individual's free will and self-determination. The citizens worried that a consequence of increased

automation of work processes would lead to a situation where no one possess the skills to carry out the jobs and that increased reliance on machines when it comes to e.g. decision making and analytical tasks will lead to a situation where the capacity for critical and independent thinking is undervalued and uncultivated, and thus lost, which would exacerbate the aforementioned standardisation and homogenization of society. The citizens worried that such a development also could lead to a loss of self-determination and identity, because critical and independent thinking are essential elements in a person's identity.

Thirdly, the citizens worried that these technologies could be used for manipulation. These worries took different shapes and concerned both manipulation of the individual, of political decisions and of information. In the same vein, the citizens frequently pointed to a fear that neuroscience research results could be used for social and political control.

The last central worry that recurred across consultations and rounds was connected to privacy and surveillance. Citizens worried that the technological developments within artificial intelligence, brain-computer interfaces and neuroscience in general could lead to a new kind of data that is sensitive in a much more pervasive way than what has been known hitherto. Likewise, they feared that different aspects of the research could be used to implement much more widespread, efficient and specific surveillance, and as such it was an additional reason for them to worry about how this research would influence privacy.

It is interesting, however, that the worries expressed by citizens were generally as focused on abuse and misuse in general as on the dual use of neuroscience. While it is important to point out, that the citizens in all countries found dual use of neuroscience to be worrying and problematic, the worries that recurred most frequently had more to do with the consequences of new technology for society and the individual, than they had to do with dual use. Dual use was a worrying circumstance, but not the primary concern, because, to the citizens, their concerns did not have to do with *who* used the research results, but rather *what* they used them for and what their intentions were.

This should also be seen in the light of a remark that recurred over and over again, that whether or not they were concerned, dual use was inevitable. The citizens in all consultations expressed the conviction, that if the military or another PSIM institution wanted to make use of the neuroscience research results they would do so. For some citizens this sentiment was the result of a feeling of resignation, while for others it was not a negative thing. In fact, citizens commented that dual use could be a positive thing, which could potentially drive the development forward.

A precondition for this, and for the support for neuroscience in general, which was emphasized over and over again across all consultations and all rounds was the establishment of legislation for neuroscience research in general, and neuroscience that could have dual use. This framework of regulation was to apply to neuroscience research as well as development and use of products based on this. This legislation, according to the citizens, was to be international in scope and provide a regulating framework with ethical guidelines, stipulating what practices are legal and illegal as well as what is ethically and morally acceptable, and it is to include guidelines on how these are to be put into practice. A supplementary suggestion that occurred frequently in this context was to establish an international committee or monitoring organisation that can enforce this regulation.

This underlined a tendency which was also evident in the last round of the consultations, that the citizens wanted there to be political discussions and action on this field. Most questions were directed at



policymakers, and among the top 10 questions from all consultations, 30 were directed at policymakers, while there were only 14 directed at researchers, 12 at citizens and 8 at stakeholders. But not only did the citizens want this to be addressed by policy-makers, the citizens wanted to be involved themselves. The citizens called for public engagement processes around technological innovations and public participation in research agenda setting. They also requested that research projects like HBP educate and inform the public about what research is going on and what results are being made.

Demographic profile of participating citizens

Data on all participating citizens:

Age:	Citizens confirmed for the consultations		Citizens showed up for the workshop	
18-29:	89	29%	78	31%
30-39:	47	15%	31	12%
40-49:	58	19%	42	17%
50-59:	63	20%	49	20%
60-69:	35	11%	34	14%
70 - :	18	6%	17	7%
Total	310	100%	251	100

Gender:	Citizens confirmed for the workshop		Citizens showed up for the workshop	
Women:	151	49%	121	48%
Men:	160	51%	130	52%
Other:	0	0%	0	0
Total	311	100%	251	100%

Education	Citizens confirmed for the workshop		Citizens showed up for the workshop	
Primary and lower secondary education:	21	7%	17	7%
General upper secondary education :	79	26%	69	27%
Vocational Education and Training:	44	14%	35	14%
Bachelor or equivalent:	70	23%	57	23%
Masters or equivalent:	78	25%	62	25%
Doctoral degree or higher:	16	5%	11	4%
Total	308	100%	251	100%

Geographical zone ¹ (percentage of population living in...):	Citizens confirmed for the workshop		Citizens showed up for the workshop	
City:	117	44%	96	44%
Town:	90	34%	77	35%
Rural:	58	22%	44	20%
Total	265	100%	190	100

¹ At some workshops, citizens were chosen according to different geographical criteria; they are not included in these numbers.



Annex 1: Top 10 questions from each workshop

Denmark

1. How do we avoid abuse of new knowledge / new methods / similar? Rules? Legislation?
Theme: Ethics; **Actors:** Policy-makers; **Number of votes:** 24
2. Who should prioritise in relation tot he economy?
Theme: n/a; **Actors:** Policy-makers; **Number of votes:** 17
3. Who has ownership oft he research results?
Theme: Ownership of research; **Actors:** Policy-makers; **Number of votes:** 16
4. How are you going to ensure that the research does not get off track? I.e. take another direction than the one 'commissioned'
Theme: n/a; **Actors:** Policy-makers; **Number of votes:** 16
5. Economic gains for? Control who sells and buys
Theme: n/a; **Actors:** Stakeholders; **Number of votes:** 15
6. What ethical rules should the researchers / organisations working with the subject adhere to?
Theme: n/a; **Actors:** Policy-makers, researchers; **Number of votes:** 15
7. How can you ensure that the human with its natural "core", which can act freely, is actually well-informed about and can make qualified decisions whether or not to participate / let be helped / medicate in relation to new research?
Theme: n/a; **Actors:** Policy-makers; **Number of votes:** 14
8. How will politicians ensure an ethical/moral boundary for the project?
Theme: n/a; **Actors:** Policy-makers; **Number of votes:** 14
9. What ethical considerations could be established to avoid abuse of the research results?
Theme: Ethics; **Actors:** Policy-makers; **Number of votes:** 14
10. Should we improve Man's abilities just because we can?
Theme: Ethics; **Actors:** Citizens; **Number of votes:** 14



England

1. Determining the limits and the purpose for which such technologies are used (Where do you intend to take this and where are the limits?) – Policymakers and researchers
2. Money, finance and tax (who pays for this, and how?) – Policymakers and researchers
3. How can citizens have a more informed sense of input and influence? – Policymakers and researchers
4. What input do we have as citizens, and how accountable a framework exists for ensuring we understand and can challenge? – Citizens, and other stakeholders including civil society
5. Risk – How do we best ensure that risk is managed in a way that secures beneficial outcomes for people and society? – Policymakers and researchers
6. Risk: What is the risk that emerges here, and how will you manage the risk? (Researchers)
7. What sense-check/approaches will you use to make sure that you know whether something is causing harm or not? (Policymakers, politicians and researchers)
8. What is the source of a common morality around such approaches when our societies are so different? How do we find a shared common ground? (Citizens, and stakeholders, especially civil society)
9. Inequality of power – how will you stop being part of a system that distributes power unequally? (Policymakers, researchers and stakeholders including companies and industry)



Germany²

1. Examination of AI and its consequences.
Theme: n/a; **Actors:** n/a; **Number of votes:** 4
2. Development of a strong value system
Theme: n/a; **Actors:** n/a; **Number of votes:** 4
3. Economy and politics should always refer to ethics.
Theme: n/a; **Actors:** Policy-makers, citizens; **Number of votes:** 3
4. Identity/ what is it to be a human being?
Theme: n/a; **Actors:** n/a; **Number of votes:** 3
5. Should society return to a non-technical way of life?
Theme: n/a; **Actors:** n/a; **Number of votes:** 3
6. Protection of the private sphere and personal data.
Theme: n/a; **Actors:** n/a; **Number of votes:** 3
7. Citizens must be included. How?
Theme: n/a; **Actors:** n/a, [stakeholders]; **Number of votes:** 3
8. Establishment of independent commissions: control over research, transparency, exchange between research community and citizens.
Theme: n/a; **Actors:** Policymakers, citizens; **Number of votes:** 3
9. What control procedure? What degree of transparency in the Military and intelligence services
Theme: n/a; **Actors:** n/a, [Citizens]; **Number of votes:** 2
10. More participation in the definition of research funding.
Theme: n/a; **Actors:** n/a; **Number of votes:** 2
11. Global Justice.
Theme: n/a; **Actors:** n/a; **Number of votes:** 2
12. Luxury problem of the rich industrialised countries.
Theme: n/a; **Actors:** n/a, [Policy-makers, Stakeholders]; **Number of votes:** 2
13. What is a good life?
Theme: n/a; **Actors:** n/a, [Researchers]; **Number of votes:** 2

² The German citizens voted on themes rather than questions



14. What and where are the limits? Who sets them?

Theme: n/a; **Actors:** n/a; **Number of votes:** 2

15. How can we guarantee that applications that benefit society are more important than potential risks (innovation has to be made available to everyone, no commercial use, for global society)?

Theme: n/a; **Actors:** n/a; **Number of votes:** 2



Italy

1. Focus on medical purpose to cure diseases and disabilities (12 votes)
2. Ethic on use and abuse in neurosciences technologies (12 votes)
3. Dehumanization (12 votes)
4. Prevent information to citizens and results publicising (11 votes)
5. How will change our human relations? (10 votes)
6. International agreement for neurosciences dual use and mutual control (9 votes)
7. How it's possible to find a common ethic between so many different cultures? (9 votes)
8. Privacy (9 votes)
9. Transition of employment replaced by machines (8 votes)
10. Define a control institution (8 votes)
11. International agreement and public consultation to define ethical values (8 votes)
12. Necessary transparent communication on the research (7 votes)
13. Rules and politicians formed to manage the risks and responsibilities (7 votes)
14. Human control maintenance over A.I. (7 votes)



Lithuania

15 votes:

- **Will there be any legislation to ensure public safety?** (*question for policy-makers*)

14 votes:

- **Is it possible (if so –how?) to stop/neutralise a robot/AI if it becomes self-willed and malicious?** (*question for researchers; categorized under „Security“*)

12 votes:

- **Will AI be able to restrict people mental capabilities or creativity?** (*question for researchers*)
- **There are no limits for improvement; however who can say that we have reached the end? Robots?** (*question for policy-makers*)
- **What kind of documents or policies should be passed to ensure everyone’s safety and how can we ensure that new technologies would not be used against us?** (*question for policy-makers, categorized under „Security“*)

11 votes:

- **What consequences can we face and who will be responsible for them? Will there be study done to investigate if AI does not distort human nature?** (*question for researchers; categorized under „Consequences“*)
- **Is there any agency, which aims to introduce new inventions to the public?** (*question for stakeholders*)

10 votes:

- **Does (and if so – how?) the state plan to prevent from the threats related to AI? Or everything will be done *post factum*?** (*question for policy-makers; categorized under „Consequences“*)
- **Do you think that there is possibility for AI to rebel against humans?** (*question for researchers*)



Malta

Number 1 (22 votes):

- *Will the European Communities be willing to fund such research, if such research had to be of a non-profit nature but only aimed at educating and empowering the citizens?* (Question for policy-maker's researchers and stakeholders, categorised under holistic education/ ethics)

Number 2 (21 votes):

- *How can the results that come out of a study be safeguarded for good use?* (Question for policy-makers and researchers, categorised under politics)

Number 3 (21 votes):

- *Can you ensure that findings for this project come from an ethical source which has no negative bias?* (Question for researchers and stakeholders)

Number 4 (21 votes):

- *What checks are in place or will be put in to place to counter systems with malicious intentions?* (question for policy makers, categorised under policy)

Number 5 (21 votes):

- *How are you going to ensure that the research does not get off track? I.e. take another direction than the one 'commissioned'* (Question for policy-makers)

Number 6 (19 votes):

- *Who/what regulated/controls/includes/excludes the following: usage; intention; results; products algorithms; methods; dosages?* (Question for policy-makers and stakeholders, categorised under medical-cure)

Number 7 (15 votes):

- *How can we ensure that the advances in neuroscience are accompanied by investment and advances in education and ethical studies?* (Question for policy-makers)

Number 8 (15 votes):

- *Can there be more research to cure disease, to facilitate peoples' life and less research to mass destruct the population?* (Question for policy-makers)

Number 9 (14 votes):

- *Who gets to choose what population gets chosen for a particular type of trial?* (Question for researchers, categorised under medicine)

Number 10 (14 votes):

- *How can researchers guarantee that our civil rights are safe-guarded?* (Question for researchers, categorised under Politics)



Portugal

1. What are the mechanisms to control the use of the project results? | How will the use of this information by third parties be regulated? | How will the budget execution of the project be controlled? Are you planning to advertise it?

Theme: Process and Product Monitoring; **Actors:** Policy-makers; **Number of votes:** 14

2. How to put limits to the political/ economic/ military use by institutions with malicious intentions? | How to ensure the ethical/ moral integrity of the programs/ games (brain-computer interfaces) to which people will submit themselves without great scrutiny?

Theme: Monitoring of research processes; **Actors:** Citizens; **Number of votes:** 14

3. How far is it beneficial to increase human potentialities?

Theme: Human development vs. “Super-Human” development; **Actors:** Policy-makers; **Number of votes:** 13

4. How to ensure access to information (for everybody)? | What is already being done and what impacts does it have or had (public unawareness)?

Theme: Information sharing and dissemination; **Actors:** Policy-makers; **Number of votes:** 13

5. What are the limits that the State imposes to the double use? | Will there be a global coordination and sharing of relevant information from different projects? | Who decides what is ethically correct or not regarding the use of this information? | How do these projects jeopardize the security of citizens? | How do these projects bring benefits to society? | What care will be taken in disclosing sensitive results?

Theme: Concerns about dual use; **Actors:** Policy-makers; **Number of votes:** 12

6. How will policy makers premeditate the access to information and decision-making in matters that directly involve the people they represent? | What about the accessibility? | Disaster relief organizations in natural disaster situations should have access to this technology | Democratization, equity (inclusion vs. exclusion), access to drugs and devices

Theme: Accessibility (information, results, materials, process, dissemination); **Actors:** Policy-makers; **Number of votes:** 11

7. Supervision by policy-makers: does legislation and a regulatory entity already exist for these studies? If yes, how to improve and adapt these studies? / by researchers: funding vs. legislation | What about regulation? | “Self-regulation” = collaborative and transparent effort (“ethics committee”/ “pilot committee for research”/ “Block Chain”) | Who promotes, who leads (from the 4 “categories” of stakeholders); who “decides”, who “controls” (benchmarking)?

Theme: Self-regulation; **Actors:** Policy-makers; **Number of votes:** 11



8. How can we guarantee that research on the human brain is used for the benefit of the human being and not the other way around?

Theme: Use for good; **Actors:** Policy-makers; **Number of votes:** 10

9. Definition of ethics/values associated with research and use of information | How to guarantee the impartiality and secrecy of results? | Ethics and decision-making power – how to inculcate values in the machine (AI)?

Theme: Ethics; **Actors:** Researchers; **Number of votes:** 10

10. How to ensure the formation of an ethical committee for monitoring advances in AI? / How to control the progress of the AI?

Theme: Focus on the AI; **Actors:** Policy-makers; **Number of votes:** 10

11. What means should be created to ensure that human beings and humanity in general are not abused? | Ethics: to what extent can we rely on the ethics of the human being? Do we (civil society) trust in the ethics of scientists, that they will not cooperate for military purposes?

Theme: Legislation/regulation; **Actors:** Researchers; **Number of votes:** 10



Slovakia

1. Is it ethical to communicate with a person in a coma and to obtain information from the brain after death?
Theme: n/a; **Actors:** citizens; **Number of votes:** 23
2. Is it always a human first?
Theme: n/a; **Actors:** policy-makers; **Number of votes:** 16
3. How to solve a financial issue so e.g. robotic limbs will be available to ordinary people?
Theme: n/a; **Actors:** policy-makers; **Number of votes:** 15
4. How is information secured against hackers?
Theme: n/a; **Actors:** businesses; **Number of votes:** 15
5. Are these surveys and consultation designed for the general public (for citizens) or for economic purposes only?
Theme: n/a; **Actors:** policy-makers; **Number of votes:** 14
6. Will people / public be informed about the results of HBP? About drugs, inventions, products?
Theme: n/a; **Actors:** policy-makers; **Number of votes:** 14
7. How can we prevent abuse of research funding?
Theme: n/a; **Actors:** researchers; **Number of votes:** 13
8. How to guarantee non-use of medicines for military purposes?
Theme: n/a; **Actors:** policy-makers; **Number of votes:** 13
9. Will artificial intelligence help people in the future?
Theme: n/a; **Actors:** citizens; **Number of votes:** 13
10. Robot or human? What can I do if I want to remain a free person with my feelings not influenced by computers?
Theme: n/a; **Actors:** researchers; **Number of votes:** 10
10. Can you identify safety risks?
Theme: n/a; **Actors:** researchers; **Number of votes:** 10
10. Who decides about the use of technology? Is it for all or for those who need it?
Theme: n/a; **Actors:** policy-makers, researchers, stakeholders, and citizens; **Number of votes:** 10
10. Are we ready for the future?
Theme: n/a; **Actors:** stakeholders, businesses, churches, and citizens; **Number of votes:** 10



Annex 2: Country Report - Denmark



Human Brain Project

Citizens' view on neuroscience and dual use

[Denmark]

Authors/Compiled by:

Nicklas Bang Bådum, project manager.

Danish Board of Technology Foundation



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Summary of results

The overarching conclusion for the workshop was that the participants were generally positively disposed towards neuroscience, even if it has potential for dual use. The majority of participants were of the opinion that the positive aspects and potentials related to neuroscience outweighed the potential risks and negative consequences. At the same time, participants voiced the conviction that it mattered very little whether they worried or not; this development is going to happen and they will not have any influence on it. As the participants saw it, the military is going to make use of what research it finds relevant.

Among the positive aspects that were most frequently emphasized about neuroscience, was the potential to improve lives and living conditions, the perspectives that it had of providing faster and more precise diagnoses, and consequently potential for more precise, efficient and effective treatment of various ailments and diseases.

Whether the research results had potential for dual use or was indeed used by militaries or defence agencies were less important to the participants, than that research conducted with public funding, including EU funding, was benefitting civil society by improving living conditions and potentially saving lives etc.

The support was, however, not unconditional or an expression of blind faith. On the contrary, in every round and across tables, the participants emphasized the need to have rules and frameworks for research and its utilization with ethical guidelines stipulating what can be accepted and what cannot.

This insistence in putting up rules, frameworks and guidelines, was also an expression of a concern that participants expressed repeatedly, of the risk of losing control of the research and the resulting technology, and particularly the concern that the results could be abused was frequent. A reason for the need for regulation could also be found in the worry that neuroscientific developments could be used for various forms of manipulation of populations and politicians. Another frequent worry was that these scientific and technological advances would negatively affect our understanding of what is normal and what is pathological and in need of treatment. In continuation hereof was the fear that these scientific and technological developments could lead us to getting out of touch with our human nature and with what makes us human.

It is worth noting that, though the participants expressed concerns about the prospects of dual use of neuroscience research, the examples they gave in that context were not their central concerns, nor were those of them that were recurrent, connected to the dual use potential in itself. Generally, the worries were more expressions of more broad apprehension towards the technological development as such.



Results from Round 1 – Research and Dual Use - Overall principles

To get the participants warmed up, they were asked to write on post-its what they thought when they heard the word “neuroscience”. The greater share of participants were positively disposed towards neuroscience. Words like “spændende” (interesting/exciting), opportunity and future were recurrent. A fairly large proportion could be said to be rather matter of fact about it, describing factual aspects like “knowledge about how the brain works” or “development of medicine”, while fewer were either scared, sceptical or ambivalent about it, pointing in particular to manipulation as a potential issue.

In the first round of group discussions, the groups were asked what they thought about the fact that publicly funded research could potentially have dual use. Two groups were outright positive about neuroscience regardless of dual use perspectives, while the rest were still supportive of such research being conducted but ambivalent about the consequences of the potential for dual use. This seems to corroborate the results of the initial questionnaire survey from the day that most of the participants were not particularly concerned about the dual use potential of HBP research.

In continuation hereof, the participants also expressed that they in general did not have an influence on such developments. Whether they worried or not about dual use, the military was going to use the research that it found useful.

When asked what aspects of neuroscientific research and dual use they found problematic, it was particularly three themes that the participants addressed. One was that they worried that some of these developments could be used for surveillance, manipulation and control in different scenarios, but generally manipulation of politicians or populations. Second, there were worries regarding the creation of technology that would get out of control and that we would be unable to stop, metaphorically represented by the image of a super-soldier that was invincible. The third fear was that technological developments and capacities would lead to devaluing or getting out of touch with our human nature, the human factors that make us human rather than robots.

All groups found research with potential dual use at once reassuring and problematic. They generally found it reassuring because such research could help save lives and improve quality of live broadly. Meanwhile, they found the uncertainty of what use the research results would or could be put to problematic and in particular the lack of control over it. This prompted several groups to emphasise the importance of frameworks and rules for the development and use of this research.

Though most groups had reservations, this did not mean that the participants were against continuing neuroscience research with dual use potential. On the contrary, with the exception of one group, all groups argued that the positive potentials of the research outweighed the potential negative aspects related to possible future military applications. A recurring statement emphasized the inevitability of the results finding military applications, if they were in anyway relevant for this, but that it is not the organisation making use of the research that was determining for whether utilization was good or bad. So while the majority of the groups were in fact worried about the prospects of neuroscience results being used for



military purposes, they also considered this an inevitability of new research, and that developing technology and knowledge that could improve lives outweighed the associated risks.

It was clear, that for the participants there were good uses and negative uses, and the distinction between the two did not necessarily coincide with civilian and military applications, respectively. Rather, good uses were generally uses which benefitted civil society, saved lives, improved living conditions and similar, but also helping soldiers with war trauma, saving lives in military action or helping protect society and democratic values, and similar.

While there were worries regarding PSIM use of neuroscience research results, when asked whether it made a difference if the dual use consisted in using the results for defence or counter-terrorism purposes, apart from two groups, of which one was divided, all groups stated that they were in favour of this. But a frequent addendum emphasized the slippery slope that is justifying dual use with counter-terrorism or defence purposes, since this distinction can be very difficult to maintain. In addition, several groups wrote that this use is alright in democratic countries, which also implies that it should not be so in all countries.

When it came to the question of whether HBP should cooperate with research initiatives or organisations that work for or receive funding from defence agencies, the groups largely agreed that it should engage in such cooperation. A frequent explanation was that it was important to create the best conditions for research and furthering scientific and technological developments. But at the same time, the groups also variously emphasized the importance of putting in place frameworks, rules and ethical guidelines for the cooperation, ensuring reciprocal openness and ensuring that the cooperation is mutually beneficial, but also that the results of the cooperation are not used by either party for purposes that were contrary to the intentions, and first and foremost, that the research was targeted to civilian applications that would benefit European citizens.

In the same vein, six of the seven groups agreed that it is not an issue if an organisation receiving funding from HBP at the same time conducts military funded research. Here it was emphasized that the condition was airtight separation between the two lines of research and ensuring that the research funding from HBP was used in civilian research to benefit the European population, rather than being used for military purposes.

In general there were two points that were recurrent across all groups. The first and most important is 'ethical' utilization of the research results, regardless of whether it is used for military or civilian purposes. This in turn depended heavily on the second point, which was underlined repeatedly: the importance of ensuring that research, development of technology, cooperation with other organisations and the use that the research is put to, is conducted within frameworks that stipulate rules for all of this, informed by ethical considerations and which also ensure that use abide by international conventions.

In summary, neither the research nor its dual use potential was primarily a problem to the participants, because it can help people, save lives and improve living conditions; however it should not be used 'negatively', i.e. to hurt people or manipulate people, decision-makers or policy-makers. That is to say, the participants were in favour of continuing the research, because of its positive qualities, which outweighed the negative risks that the research entails. But it is important that the research is conducted in order to help civil society and regular citizens, to improve living conditions and make life better, and that there were frameworks and rules as well as ethical guidelines for development and use of the research. Lastly it was



important to the participants that the development of technology and knowledge about the brain does not remove us from our humanness and negatively affect our view of human nature.

Results from Round 2 – three areas of research

Medicine

To the five groups discussing the potential developments in medicine driven by neuroscience, the positive aspects were in particular the ability to develop more precise diagnosis and to medicate more accurately, thereby improving treatment of e.g. mental ailments. Also in focus was the prospect of being able to develop new medicine that treats more accurately and maybe being able to treat or cure diseases or illnesses that we cannot today. In continuation of both of these, was the central aspiration of being able to foster a better quality of life and relieve suffering.

When addressing the negative aspects, focus was in particular on the risk of getting out of touch with ‘the humane’, i.e. medicinal treatment of essentially natural emotions or symptoms, and a fear of what is lost if medication is used in this way, a fear of streamlining or man becoming a machine and suppressing natural human emotional and physical reactions.

When discussing the dilemmas that this development could cause, the participants particularly focused on what such medication would do to our understanding of what is normal and that maybe a ‘new normal’ could require medication of healthy people, which is in continuation of the discussion of the negative aspects. At the same time they were also well aware that the same medicine could be used for both good and bad purposes, and that such dilemma can be hard to avoid.

When asked whether the positive aspects outweighed the negative, three out of the four groups that responded to the question, agreed that they did. The last group pointed to both the need to move on as a reason for continuing the research, but at the same time asking whether the risk of losing control is not too big a risk.

To the question of whether they were concerned about this research being conducted, two groups were unconcerned, while one emphasised that on this topic there should be no cooperation with the military. The last group was ambivalent; it was unconcerned because of the advantages to be gained, but concerned because the consequences of the research are not known.

Artificial intelligence (computer learning)

There was great variation among the four groups discussing the positive aspects of artificial intelligence, though aspects relating to medical treatment and health were, in different guises, a recurrent theme; particularly earlier, faster and more precise diagnoses, which was addressed by three groups. Other positive aspects concerned precision in warfare, surveillance and anti-terror, avoiding human error, improving living conditions.

When it came to the negative aspects of artificial intelligence, the most recurrent theme was the lack of control that it would create, e.g. in connection with autonomous weapons and stock trade as well as the risk of surveillance.



To the four groups, the dilemmas that occur with artificial intelligence were very much concerned with whether they would be intelligent and potentially smarter than humans and whether they would start making decisions either too fast or without considering the humane elements, which relates back to the question of whether it can be controlled. Also the question of whether it would help protect or control society was raised and whether it could in effect manipulate with humans' free will.

For the groups it was not as clear a choice to say whether the positive aspects outweighed the negative ones. While one group believed that to be the case, two groups answered both yes and no, while the last group answered that it depends on each situation. However, when answering whether this type of research being conducted concerned them, two answered no, while one answered yes and no, and the last didn't answer.

Brain-computer interfaces

All five groups discussing brain-computer-interfaces except one, pointed to the ability of this technology to potentially help paralyzed people (re)gain mobility and the increase in standard of living that this would entail, when they were asked about the positive aspects of this development. In the same vein, the same groups also pointed to the ability to compensate for lost or amputated limbs, whereas three of these groups also addressed the technology's ability to help improve understanding and treatment of people with mental ailments.

The negative aspect that occurred the most was the fear that it would become possible to read someone's mind, with four of the five groups emphasizing this; especially in relation to manipulation and surveillance of thoughts. In three of the groups, the participants also pointed to a fear that such a development would risk removing what makes us human and in effect reduce our humanness. There were also worries about the distribution of responsibility when someone is equipped with a robotic limb, the limb or the person?

To these groups, the most central dilemma that this development entailed was one of maintaining a humane view of what it means to be human, what constitutes an unhealthy or pathological condition and whether we should 'improve' people simply because we can.

On the question as to whether the positive aspects outweigh the negative ones, three of the four groups agreed that this was the case, while two groups specified that it was dependent on topic or use in question, and one group stating that it feared a narrow-minded societal view of normality.

Four of the five groups were, with the words of one of them, critically supportive of this kind of research. They gave reservations that can be summed up as: the research is alright, but it needs to be in accordance with some ethically informed guidelines and that take the dilemmas into consideration. The last group stated that just because something is possible, it does not mean that it should be done.



Cross-cutting

There were some themes that recurred across all three areas of research. In terms of the positive aspects, it was especially the perspective of improving diagnoses by making them earlier and more specific and the ability to provide better medical treatment by means of a better understanding of various ailments and diseases.

One negative aspect which recurred was the worry that by developing these new technologies and insights we would risk losing touch with our humanness, and the risk that our understanding of normality would be distorted because of these technological advances so healthy people would not be treated as such or that healthy and natural symptoms would be treated as pathological or unwanted. In addition, there were worries about whether we would lose control with the technology that was being developed and worries about surveillance.

The dilemmas that were recurrently emphasised in all three examples were much in the same vein: these developments risk changing our perception of what is normal, perverting our view of human nature and making us start to treat natural emotions and symptoms as pathologies.

Looking across the three example areas, the participants seemed, to use the words of one of the groups again, critically supportive. They largely considered the positive aspects to outweigh the negative ones, and while there were some worries regarding all three technologies, most of the participants were still in favour of further research.



Results from Round 3 – Questions to address in the future

Top 10 questions:

1. How do we avoid abuse of new knowledge / new methods / similar? Rules? Legislation?

Theme: Ethics; **Actors:** Policy-makers; **Number of votes:** 24

2. Who should prioritise in relation to the economy?

Theme: n/a; **Actors:** Policy-makers; **Number of votes:** 17

3. Who has ownership of the research results?

Theme: Ownership of research; **Actors:** Policy-makers; **Number of votes:** 16

4. How are you going to ensure that the research does not get off track? I.e. take another direction than the one 'commissioned'?

Theme: n/a; **Actors:** Policy-makers; **Number of votes:** 16

5. Economic gains for? Control who sells and buys

Theme: n/a; **Actors:** Stakeholders; **Number of votes:** 15

6. What ethical rules should the researchers / organisations working with the subject adhere to?

Theme: n/a; **Actors:** Policy-makers, researchers; **Number of votes:** 15

7. How can you ensure that the human with its natural "core", which can act freely, is actually well-informed about and can make qualified decisions whether or not to participate / let be helped / medicate in relation to new research?

Theme: n/a; **Actors:** Policy-makers; **Number of votes:** 14

8. How will politicians ensure an ethical/moral boundary for the project?

Theme: n/a; **Actors:** Policy-makers; **Number of votes:** 14

9. What ethical considerations could be established to avoid abuse of the research results?



Theme: Ethics; **Actors:** Policy-makers; **Number of votes:** 14

10. Should we improve Man's abilities just because we can?

Theme: Ethics; **Actors:** Citizens; **Number of votes:** 14

Across all questions there was a clear tendency towards questions being directed at policy makers and researchers, with 33 and 31 questions directed at each, respectively, which is far more than citizens and stakeholders with 17 and 14 questions, respectively.

Among the 10 questions with the most vote, a related tendency was visible, with eight questions addressing policy-makers and one at each of the remaining target groups (one question was overlapping two groups).

As to the content of the most voted for questions, there was also a clear tendency, which follows some of the themes from the previous rounds. Of the 10 questions, half revolved around how to avoid abuse of the research results and what rules, ethics and morals should be observed and how they could be established. Two questions addressed ownership of research results and who stands to make economic gains from them. One question concerned how actually informed and qualified consent can be given in relation to new research, with another concerning prioritization of economy and the last asked whether we should improve Man's abilities just because it is possible?



Key themes across rounds

One of the most central themes that recurred across rounds and tables was that the participants generally approved of the neuroscience research being conducted regardless of its dual use potential, they also emphasized the need to put in place frameworks, rules and ethical guidelines for neuroscientific research and utilization of the results.

When speaking of the positive potentials related to neuroscience, it was particularly the potential to improve living conditions and the perspective of being able to provide better and faster diagnoses, gain better understanding of mental ailments and potentially develop new and more targeted and thus efficient remedies, treatments or cures for diseases. Generally the most important thing was that the research conducted by HBP and other publicly funded research initiatives were benefitting civil society, saving lives, improving living conditions etc.

Another general theme was that the worries and concerns expressed by the participants were less to do with the potential for dual use, and were more related to a general apprehension regarding the perspectives of general technological and scientific developments. The most frequent concerns and worries were related to whether we could control the research results and whether they would lead to technology that we would be unable to control, and that the results could be used for various forms of manipulation. The last frequently recurring worry was that the research and results could negatively affect our understanding of what is normal and what is pathological and in need of treatment. In continuation hereof is the fear of getting out of touch with what makes us human and our human nature.

Questionnaires

Start of the day questionnaire

Before the programme started on the participants filled out a questionnaire with four questions. The first question asked how concerned the participants were that HBP research could be used by others for political, security, intelligence or military purposes, on a five point scale from 1. “Not at all concerned” to 5. “Extremely concerned”. 13 out of the 31 participants answered that they were slightly concerned, and eight answered that they were moderately concerned. Only one was extremely concerned, while four were not concerned at all. The second question asked whether, if publicly funded research has dual use potential, it should still be allowed. Out of 31, 25 answered yes and only one answered no, and five that they did not know / wish to answer. The third question concerned whether HBP should cooperate with other research initiatives or organisations that receive funding from or work for defence agencies. 8 answered no, while 15 answered “yes, but only initiatives or organisations in countries that have signed and ratified international treaties on e.g. chemical or biological weapons”. Five answered “Yes, the most important thing is to make progress in the research”. The last question asked whether the European Commission’s focus and commitment to *open science* should also be maintained with research that has potential for dual use. 21 answered yes, six answered no, while four did not know or wish to answer. These results indicate, that before having been through the day, the participants were neither particularly concerned about the dual use potential of research in general, nor about that of HBP, though the results were indicative of a tendency that would be clear throughout the day: that to the participants regulation and frameworks were important for the continued confidence in this research, in this case specifically, that cooperation should be with initiatives or organisations based in other countries that have signed treaties and convention about e.g. chemical or biological weapons.

End of the day questionnaire

At the end of the day, the participants were again asked to fill out the same questionnaire as they did in the morning, to see if participating in the consultation had affected their opinion.³

To the first question, as to how concerned they were about the dual use of HBP research, the participants were even less concerned in the afternoon, than in the morning, with 17 saying 2., that they were slightly concerned, which is four more than in the morning. Two fewer (six) said 3., moderately concerned and one fewer (four) said 4., somewhat concerned, while two said 5., extremely concerned. There were still four that said 1., not concerned at all. Meaning that they were generally less concerned than in the morning.

To the second question, regarding whether to allow publicly funded research that has dual use potential, 28 said yes, as opposed to 25 in the morning, and two said no, as opposed to one in the morning.

To the third question on cooperation with organisations or initiatives receiving funding from or working for defence agencies, in the afternoon there were five saying no, as opposed to eight in the morning, while eight (three more than in the morning) said “Yes, the most important thing is to make progress in the

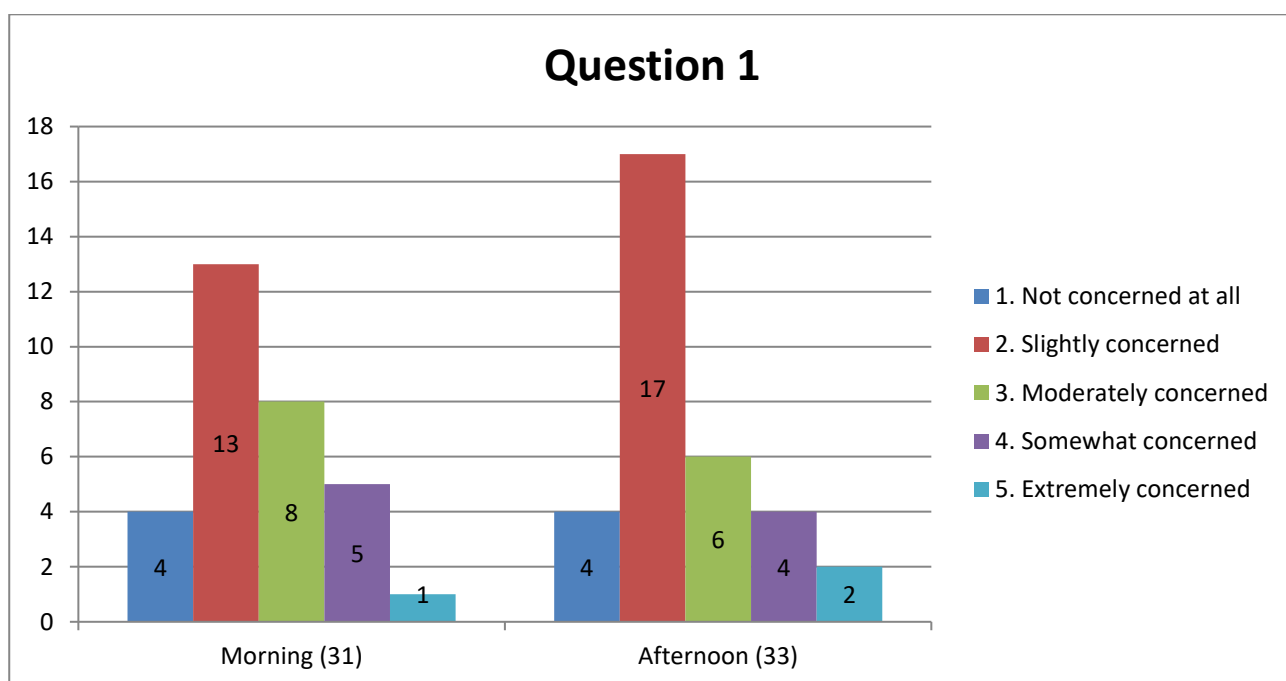
³ There were two more filled out questionnaires in the afternoon, than in the morning, as some participants did not have time to fill them out in the morning.



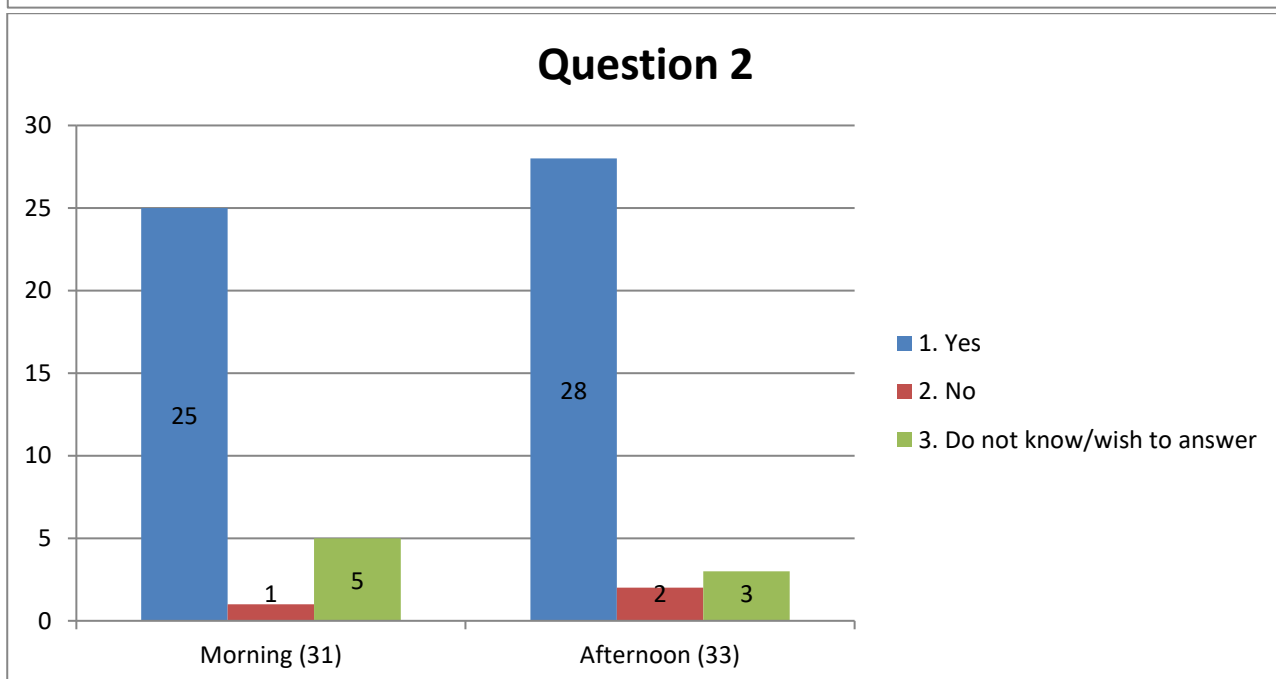
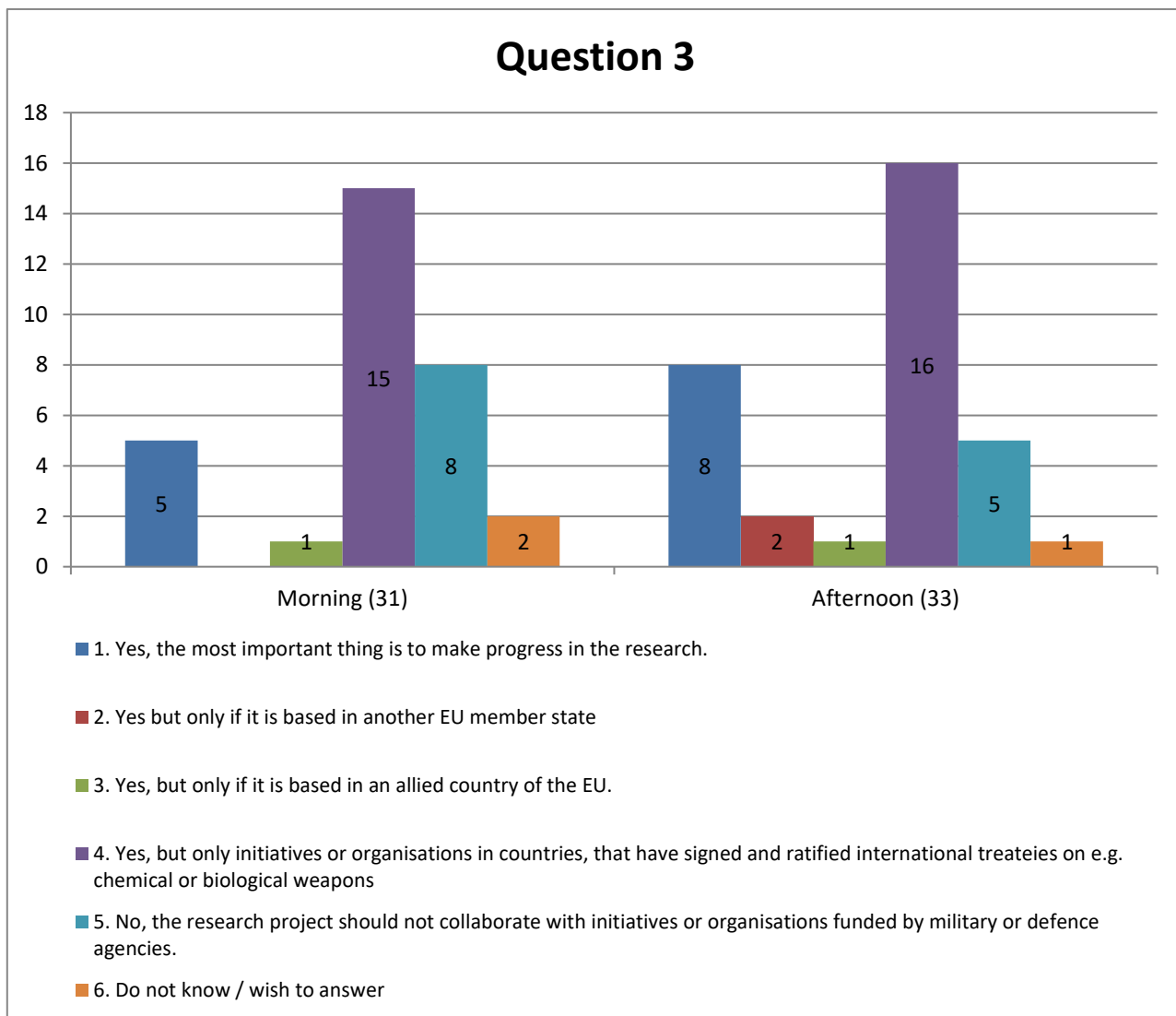
research”. With 16, the largest share was of people saying “Yes, but only initiatives or organisations that have signed and ratified international treaties on e.g. chemical or biological weapons”, which was one more than in the morning.

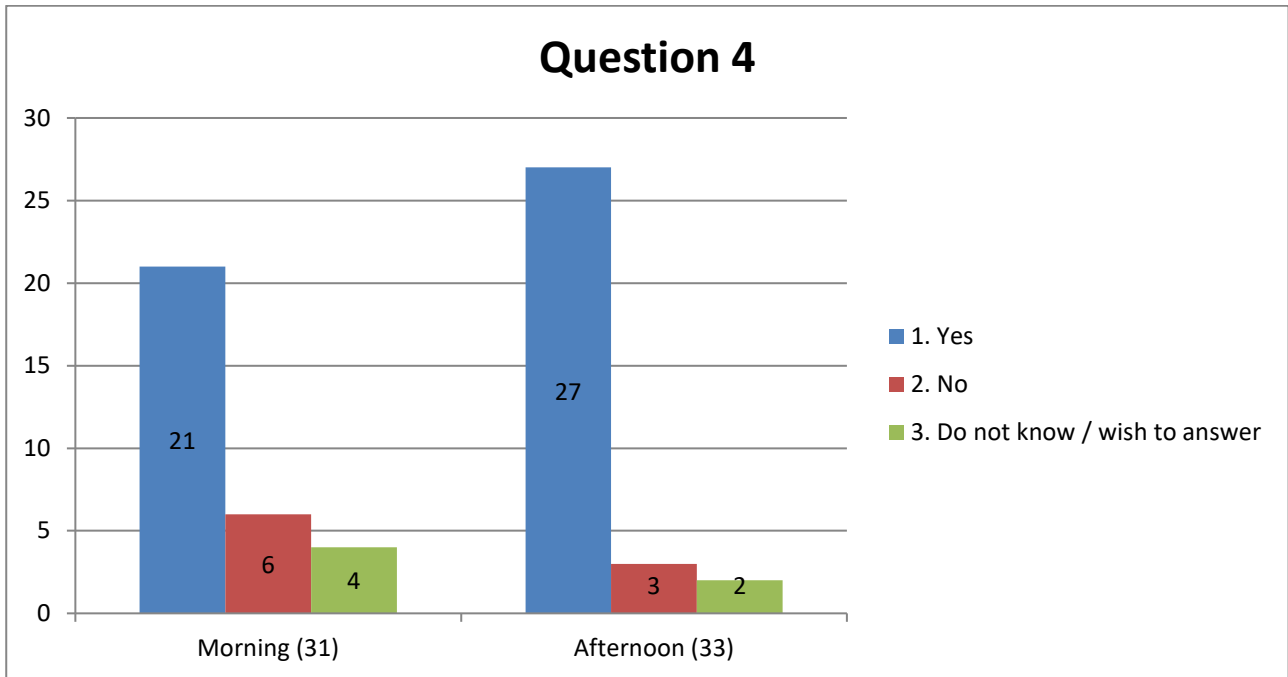
To the last question, as to whether the European Commission’s focus on *open science* should be maintained in cases where research has potential dual use, 27 said yes, which is six more than in the morning, with three saying no, which is three fewer than in the morning.

As a general conclusion, in the course of the day the participants had grown more positively disposed to research with dual use potential and less concerned and positively disposed to cooperating with organisations and initiatives working for or receiving funding from defence agencies.⁴



⁴ For full results, see annexes 4 and 5





Demographic profile of participating citizens

The age distribution of the participants that participated on the day, is close to reflect the composition of the Danish population in general. The same goes for the representation of men and women.

The biggest misrepresentation is in terms of education level of the participants. Only four among those who signed up for the workshop had primary and lower secondary education, of which 2 were confirmed and one showed up. In the other end of the scale, there was overrepresentation of people with master's degrees or equivalent and doctoral degree. This misrepresentation is explained mostly by the complexity of the subject of the consultation.

Data on the participating citizens:

Age:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group (general population)
18-34:	9	9	26,5% (event) 28% (PT)
35-44:	5	3	9% (event) 14% (PT)
45-54:	9	6	17,5% (event) 15% (PT)
55-64:	10	7	20% (event) 17% (PT)
65-74:	5	3	9% (event) 13,5% (PT)
75 - :	6	6	17,5% (event) 7,1% (PT)

Gender:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the gender (general population)
Men:	22	16	47% (event) 49,5% (PT)
Women:	22	18	53% (event) 50,5% (PT)
Other:	0	0	0



Education	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
Primary and lower secondary education:	2	1	3% (event) 26% (PT)
General upper secondary education :	4	4	12% (event) 15% (PT)
Vocational Education and Training:	9	7	20,5% (event) 30% (PT)
Bachelor or equivalent:	8	4	12% (event) 16% (PT)
Masters or equivalent:	12	12	35% (event) 9% (PT)
Doctoral degree or higher:	9	6	17,5% (event) 1% (PT)

Geographical zone (percentage of population living in...):	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
City:			
Town:			
Rural:			

Other aspects of relevance in your country?

Participants were not sorted according to the geographical zone they lived in, they were sorted according to the region they lived in, ensuring that all geographical parts of Denmark were represented, aiming for attaining geographical dispersion.



Annex 2.1 – Translated templates from round 1

Group 1:

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

It is frightening but probably cannot be avoided.

Research is necessary for the sake of fighting illnesses and furthering health in general

Can be used to help soldiers with war trauma

Do you find it problematic or reassuring? Please explain (why/why not?)

We find it problematic if we “make” super-soldiers.

We find it problematic if we harm human beings.

We find it problematic in case of civilian use → manipulation of civilians.

Comforting if we can use it to treat/prevent illnesses – save lives.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

“The super-soldier” is a worrying thought (physical, mental change). That you remove the humane in a soldier.

Worrying if it can be used for surveillance of civilian citizens.

Manipulation of civilians is a problem.

Does it make a difference if the use of the research by the military or intelligence agencies is for defence or counter-terrorism purposes?

In theory it is alright that it is used for defence or counter-terrorism, but “defence” can be a wide concept which can be abused.

As long as there are clear rules and compliance with conventions.

It is difficult to distinguish defence/offence or counter-terrorism purposes.

[...] Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?



In brief: YES! Together better results can be attained.

But there has to be clear cooperation agreements on premises and utilization of results and openness.

Please explain why/why not?

Clear limits need to be set to avoid abuse of knowledge sharing.

Results should be open within ethically determined limits.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

We do not agree in the group.

Yes: cooperation advances results that can benefit all parties.

No: It is necessary to question motives and credibility.

Please explain why/why not?

See previous answer

Group 2:

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

Not nervous – spend the money anyway

Not nervous – use the results well, not negatively.

Without influence

supportive, but worrying.

Do you find it problematic or reassuring? Please explain (why/why not?)

Both a problem - and reassuring

[problem] → 1. If it is used negatively. 2. Uncertainty

[Reassuring] → improve quality of life for all.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?



Making the human mechanical → forget the humane
Who decides who utilises the research results
What are the core values for utilization?
“Everything is allowed as long as it is in the name of growth”

Does it make a difference if the use of the research by the military or intelligence agencies is for defence or counter-terrorism purposes?

No difference in Denmark [*sic.*] context (-and democratic countries)
Less worrying, if the purpose is positive
It can be culturally determined, that we do not think it makes a difference.

[...] Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Same ethical / moral foundation as the cooperating organisation
Sign moral codex
There should be a framework → consequences → punishment
It is good to positively influence others

Please explain why/why not?

To ensure not exchanging knowledge with organisations with “negative” intentions

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Yes, because the purpose is decided at the end of the process.
Depends on the purpose of the military research

Please explain why/why not?

A tendency to focus on the negative aspects of the military
Value based

**Group 3:**

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

Public research is published anyway. For this reason it is not a problem.
Public research must still be published.

Do you find it problematic or reassuring? Please explain (why/why not?)

Problematic:

Conflict of interest money and power, abuse
Manipulation of leaders and are decision-makers influenced
1. supernation

Reassuring:

Public resources, that are used for the military provides us with influence
One supernation, which is invincible, and is thus ensured its position as world leader.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

Invincible universal soldier
Planning a military coup
Utilization of research, that was not the intention
influence politically
Can the perfect soldier be stopped?

Does it make a difference if the use of the research by the military or intelligence agencies is for defence or counter-terrorism purposes?

Yes,
Prevention of terror and radicalism
A counter-terrorism purpose can often entail interventions in another country, which entails civilian losses.

[...] Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?



Yes, if...

International conventions

Ethical set of rules

Please explain why/why not?

+ saves more than are killed

÷ Cannot foresee consequences of a “China” cooperation

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Yes

Please explain why/why not?

Openness about results

influence on the development

insight and knowledge

information and knowledge-sharing

knowledge-sharing will in the long term increase the standard of living globally

Group 4:

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

Inevitable that it will be used – which is positive

important that the democratic world possess the most vast knowledge – also military knowledge

Do you find it problematic or reassuring? Please explain (why/why not?)

Ethical utilization of research is important both military and civilian

problematic in a non-democratic society

Discussion is important because curiosity is boundless – thus frameworks and use of research is necessary

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

Regulatory control and surveillance is not only positive.



Does it make a difference if the use of the research by the military or intelligence agencies is for defence or counter-terrorism purposes?

No, the underlying ethics are still the same.

[...] Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

As long as the framework is alright, there ought to be cooperation in order to get as much knowledge into the project as possible.

Please explain why/why not?

[why]

openness – knowledge about each other
Development of research environments
Better results

[why not]

who controls

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Yes they can, but healthy scepticism towards conflicts of interest.

Please explain why/why not?

[why]

The amount of resources is larger

[why no]

Possibly different focus on direction.

Group 5:

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?



Good discussion. Knowledge has no borders, so we cannot prevent that the attained results are used by militaries.

But the research should target / be thought into the civil society to the benefit of the individual human being and society.

Remember: the military should be a part of the democratic society.

Do you find it problematic or reassuring? Please explain (why/why not?)

We do not agree. We are divided regarding:

1: Development of weapons to combat enemies is reassuring

2: Abuse in relation to ethical values – used in connections that were not thought of as part of the purpose.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

Don't agree:

Worries regarding control of people/groups

Worries regarding disclaiming responsibility in among other things war.

Worries that others will get ahead in the research, so we will become victims / losers.

Does it make a difference if the use of the research by the military or intelligence agencies is for defence or counter-terrorism purposes?

In a democratic context it is alright that the research is used.

Difficult questions.

Several in the group do not believe that it makes a difference, the worries are the same.

[...] Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

We disagree. There is disagreement about:

1: Yes to cooperation regarding civilian purposes.

2: American and China do not distinguish between military and civilian research. Thus cooperation is worrying.

Please explain why/why not?



Ad 1: cooperation is necessary to gain knowledge. The European project should be able to put in place a framework for exploitation of the results.

Ad 2: Difference in values and ethics in EU/DK and USA and China. Strange to cooperate with USA's and China's military, if we do not want to cooperate with the European military.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

It is OK. But important with borders between the projects. Important to be critical regarding who one is cooperating with, as research is only research if there is a certain independence present.

Please explain why/why not?

Research needs to be regulated, there need to be contracts. It is important to continuously underline the civilian purpose, the ethical values and that the projects should be of benefit for the European populations. We are aware that realpolitik-ally the results are exploited by militaries, but it should not be the primary purpose with the research.

Group 6:

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

Use of research for military or intelligence purposes is acceptable provided that the intention is to preserve and protect our democratic societies.

Do you find it problematic or reassuring? Please explain (why/why not?)

"We will take the risk". Problematic that the research is spread so widely that it can fall in the wrong hands and thus be used for manipulation of the human brain.

Reassuring if the research is used to save human lives, or minimise losses both civilian and military.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

Worrying if humans are deprived of their humane qualities.



Does it make a difference if the use of the research by the military or intelligence agencies is for defence or counter-terrorism purposes?

Yes, because we believe that it can be part of protecting our society and democratic values. The intention should similarly be to create peace of mind in the population.

[...] Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Yes. The importance of knowledge sharing. Possibly different perspectives.

Please explain why/why not?

Necessary with cooperation to further develop the research and to put it into perspective.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Yes. One thing does not exclude the other.

Please explain why/why not?

As a starting point, we do not see it as a problem than an organisation conducts research funded by militaries and civilly, respectively.

Group 7:

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

It is probably inevitable that research is used by militaries sooner or later.
Some believe that it is a bad idea.

Do you find it problematic or reassuring? Please explain (why/why not?)



Problematic because it is unknown how the research results are used.

* Should we intervene in nature in connection with the brain, at all?

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

There needs to be ethical / political control with all research.

Better to support own civilian research and gain openness and transparency than surprises from others.

Does it make a difference if the use of the research by the military or intelligence agencies is for defence or counter-terrorism purposes?

Yes, if it can be separated!

[...] Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Yes, but only under the condition that we have equal terms ethically / politically regarding exploitation of research results.

Please explain why/why not?

As EU-research is publicly available we must have the same from other organisations.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

No

Please explain why/why not?

Funding from HBP must not be used by companies doing military research. HBP must not actively support military research.

Annex 2.2 – Translated templates from round 2

Medicine

Table 1

What are the positive aspects of this development?

Faster and better diagnosis and treatment

New treatments of previously incurable diseases

Better treatments of veterans

What are the negative aspects of this development?

[Over/hyper]-diagnosing [overdiagnosticering, red.]

Removes the “human” part of the soldier / civilian

Abuse

What kind of dilemmas will this development cause?

The same medicine can be used for both good and negative purposes

Challenges the concept of “normality” [normalitet, red.]

Do the positive aspects outweigh the negative? Or vice versa

Yes the positive aspects are larger than the negative

Are you concerned that this kind of research/development is carried out?

No, on the contrary

Table 2

What are the positive aspects of this development?

Improve quality of life, less use of animal testing, cure diseases, help the hospital service.

Improvement of behaviour.

Research to avoid medicine. Avoid inappropriate medication.

What are the negative aspects of this development?

If it is abused. Side effects.

Can be given without consent. Everything that causes death and destruction.

Toxins – can have widespread effects.

Difficult to regulate.



What kind of dilemmas will this development cause?

Cannot [avoid/prevent] negative aspects

Do the positive aspects outweigh the negative? Or vice versa

Yes – otherwise we will never move on

No – you could lose control – who sets the boundaries? [rammerne, red.]

Are you concerned that this kind of research/development is carried out?

No because of all the advantages

Yes – not all the consequences are known

Table 5

What are the positive aspects of this development?

Differentiation in treatment of mental ailments.

Relieve suffering, but without removing the human nature.

What are the negative aspects of this development?

Should otherwise healthy people be treated with medicine that increases their ability to perform and [effectivity/efficiency, red.]?

What is excluded from the brain if other areas are strengthened above capacity (love, presence, empathy?)

What kind of dilemmas will this development cause?

Alterations to the human's profile

Who is to decide what is normal and what is not?

Do the positive aspects outweigh the negative? Or vice versa

Yes, as long as the dilemmas are taken into consideration.

Are you concerned that this kind of research/development is carried out?

Same answer as previous topic [from previous topic: "not so long as dilemmas are taken into consideration and the intention is made clear", red.]

Table 6

What are the positive aspects of this development?

Positive that laboratory animals are not necessary.

Disagreement about concentration enhancing medicine – it can be considered necessary in relation to demands of a study [drugs used for enhancing students' ability to study, red.]



More precise diagnosis could be both positive and negative. Precise diagnosis can help improve life. Others believe that it is false [comfort/security].

What are the negative aspects of this development?

Streamlining [Danish: ensretning, red.]

Airborne chemical substances are dangerous

What kind of dilemmas will this development cause?

Can mental ailments be formalized? [sættes på formel, red.]

Do the positive aspects outweigh the negative? Or vice versa

Are you concerned that this kind of research/development is carried out?

Table 7

What are the positive aspects of this development?

Remove / relieve illnesses

What are the negative aspects of this development?

You become distanced from the humane, if it is used to suppress [emotions/feelings]

Man becomes a machine

What kind of dilemmas will this development cause?

Ethical dilemmas should be evaluated continuously

The knowledge that is gained can be used negatively – should the research be continued?

Who controls, who takes the medicine?

Can the soldier / the employee / the student feel pressured [into taking it, red.]

Do the positive aspects outweigh the negative? Or vice versa

“More negative consequences / purposes than brain/computer-tech”

The development should not be stopped because of the negative aspects.

Are you concerned that this kind of research/development is carried out?

On this subject, there should be no cooperation with military-funded organisations.



Brain-computer-interfaces

Table 3

What are the positive aspects of this development?

Higher standard of living : exoskeleton

Regain [mobility/use of limbs] (Danish: førlighed)

Help paralyzed / blind /deaf persons

What are the negative aspects of this development?

Can read minds – must never be possible (“empties the brain”)

What kind of dilemmas will this development cause?

What if other superpowers can “mind read”, should we also be able to?

The control of resources

Do the positive aspects outweigh the negative? Or vice versa

Yes

Are you concerned that this kind of research/development is carried out?

Generally no : but mind reading is very troubling.

Table 4

What are the positive aspects of this development?

Relieve illness / handicap – both physical and mental

Develop games / simulations

Relieve sufferings

[effectivity / efficiency] (Danish: effektivitet)

Training of pilots

What are the negative aspects of this development?

Troubling to read peoples’ [minds/thoughts] without consent

Mind control (Danish: sindelagskontrol)

Manipulation – e.g. treatment of ptsd should be integrated, not remove memories.

What kind of dilemmas will this development cause?

We already do profiling, but manually

Should we improve people, because we can...

Read [thoughts/the mind] of an unconscious, e.g. in inheritance cases (Danish: arvesager)



Privacy

Do the positive aspects outweigh the negative? Or vice versa

From topic to topic

In relation to helping, yes! Not necessarily by improving.

Are you concerned that this kind of research/development is carried out?

It is like cloning – you shouldn't always just because you can

Table 5

What are the positive aspects of this development?

Tools to strengthen physical ability, among other things in connection with handicaps.

In certain cases treatment of mental / neurological diseases, but with reservations for making up one's mind [Danish: stillingtagen, red.] regarding the underlying causes/intentions.

Simulation training to strengthen appropriate reaction patterns.

Aids for soldiers in combat.

What are the negative aspects of this development?

Risks that robotic limbs can be hacked.

Risk of taking away Man's ability to think for himself (the free will / nature)

Change Man's natural profile.

What kind of dilemmas will this development cause?

What is an unhealthy condition? (homosexuality, dyslexia, etc.)

Should Man have free will taken away? (the right decide over [psyche/mind] and body)

Do the positive aspects outweigh the negative? Or vice versa

Predominantly positive as long as dilemmas are taken into account.

Are you concerned that this kind of research/development is carried out?

Not as long as dilemmas are taken into consideration and the intention is clarified.

Table 6

What are the positive aspects of this development?

Amputated limb – you get a new one.

Paralysis – functional impairments [are compensated (difficult to read, best guess, red.)] by technology

Mental ailments / depression is uncovered and is treated positively



What are the negative aspects of this development?

Can read a human's thoughts

External robot skeleton – is the human or the computer in control and who is responsible?

Humans should still be humans!

What kind of dilemmas will this development cause?

Maintain human values and view of humanity

Positive regarding civilian purposes, but negatively dispositioned to the military ones

Do the positive aspects outweigh the negative? Or vice versa

Fears an all too perfect society with narrow-minded conception of normality, but positive towards solutions to mental and physical ailments.

Are you concerned that this kind of research/development is carried out?

If it is in accordance with the ethical guidelines, we are positively disposed to the civilian doings [Danish: gøremål].

Table 7

What are the positive aspects of this development?

That it is controllable in comparison with medicine

Many opportunities

What are the negative aspects of this development?

Surveillance of brain activity -> abuse of knowledge

Manipulation -> control of population groups

Too much trust in a machine

Incorrect preliminary work

Reduces humanity (Danish: menneskelighed)

Invasion of privacy

What kind of dilemmas will this development cause?

There is uncertainty -> the technology has positive opportunities, but can have negative consequences that are hitherto unknown

Do the positive aspects outweigh the negative? Or vice versa

The negative aspects should not stop the development



“Yes, the positive aspects weigh highest” <- agree

There appears to be more positive aspects than negative

Are you concerned that this kind of research/development is carried out?

“No”

“Yes, but am not against it”

Supportive, but critical



Artificial intelligence (computer learning)

Table 1

What are the positive aspects of this development?

Faster diagnosing

Faster and better analysis of large quantities of data

Faster action towards pandemics / epidemics

What are the negative aspects of this development?

Lack of control of e.g. stock trade / financial crises.

Lack of humane dimension

What kind of dilemmas will this development cause?

Human errors are eliminated

Automatic decisions become too fast

Do the positive aspects outweigh the negative? Or vice versa

Yes and no.

Are you concerned that this kind of research/development is carried out?

Table 2

What are the positive aspects of this development?

Earlier treatment and diagnosis -> more precise because of [unintelligible] (meaning of it is that treatment and diagnosing becomes better because of better data and data handling capacity, red)

Surveillance – creates [safety/comfort](Danish: tryghed) ? illness, [defence/defense] / avoid human error.
Encoding

War = precision

What are the negative aspects of this development?

Surveillance because of abuse of data

Manipulation of free will

What kind of dilemmas will this development cause?

Doing without humane element

Where will we end? Will they be [smart/ intelligent] (Danish: kloge)

Abuse of data

Manipulation of free will



Do the positive aspects outweigh the negative? Or vice versa

Yes development + research = progress

Nej ? the more computer the more stupid / less free will for humans.

Are you concerned that this kind of research/development is carried out?

Yes

No

Table 3

What are the positive aspects of this development?

Better living conditions

Bullying / anti-terror

Fighting (youth) crime

School work (Danish: Skole arbejde)

Minimizing human errors

What are the negative aspects of this development?

Surveillance / control

Marketing, targeted advertisements

Autonomous weapons – risk of failure

What kind of dilemmas will this development cause?

Does one have surplus energy (Danish: overskud) to command / is it possible for one to comprehend/command / get an overview of all analyses and marketing?

Risk of “an A and a B team”

Privacy? Is it possible to opt out?

Do the positive aspects outweigh the negative? Or vice versa

Yes. The believe in “the good”

Solves more problems than they create

Are you concerned that this kind of research/development is carried out?

No, generally it is ok...

Table 4

What are the positive aspects of this development?

Help for everyday life



Fighting illnesses

Fewer clinical trials

Faster diagnosing

Robots in mine searching

Civilian resource savings

Precision in military

More jobs

What are the negative aspects of this development?

Horror scenario from Hollywood

Autonomous artificial (Danish: konstel (sic.)) intelligence

Profiling -> guessing future actions is a problem

Automatic weapon systems

What kind of dilemmas will this development cause?

Who is programming?

What if it is infected with virus?

Listen to research / op eds (Danish: opinionsleder)

If we program it, can it becomes [smarter/more intelligent] (Danish: klogere) than us?

Protecting vs. controlling society

Do the positive aspects outweigh the negative? Or vice versa

e.g. self-driving cars -> safer to automate, but freedom to drive a car (Danish: køre selv)

It depends on each situation

1.1.1

Are you concerned that this kind of research/development is carried out?

No, but need for research in how we are prepared (Danish: rustede) / ready for artificial intelligence.

Annex 2.3 – Translated templates from round 3

Insert the translated templates and vote count

Table 1⁵

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Laws and rules	International agreements regarding “cyber warfare” of different kinds (like the Geneva Convention) (12)			Citizens: What boundaries and guidelines should we allow regarding neuroscience? (0)
Ethics	How do we avoid abuse of new knowledge / new methods / similar? Rules? Law? (24)	What defines “normality”? (10)	What defines “normality”? (0)	Who defines the concept “normality”? (1)
		Researchers: with what ethics do you conduct you research? (6)	Are the ethical and philosophical researchers involved in setting boundaries? (4)	

⁵ Numbers in parenthesis indicate the amount of votes each question received.



Table 2

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	Are you doing enough to inform the country's citizens about this HP (<i>sic.</i>) project (1)	Does artificial intelligence make the world a better place or just more practical? (3)	Economic gains for ...? Control who sell and buy (15)	Are you ready for more surveillance? (1)
	Politicians must be involved, possibly legislate on military use of civil research (0)	Researchers: their task is to do research. Ethics are good, but not a precondition for becoming a good scientist. The ethical questions should be handed over to others. (2)	Research funded by EU funds becomes a good bargain for private companies. Is it okay? (6)	Do you need machines to think for you? (1)
	Control (0)			How much influence should we citizens have (without the proper qualifications) as to who or what is researched?
	Define frameworks for where the HBP research and who it can be use by (1)	Concerning medicine: Remember also to focus on how to limit medicine, and not just to develop it (3)		
	Are the ethical boundaries observed? (12)			
	Politicians should give economic			



	support for greater		
		More information for the citizens (1)	
		Openness between [yourselves/you, Danish: jer]. Dialogue between everyone (3)	
		Openness about what is researched into and the results is necessary (5)	

Table 3

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Openness / knowledge-sharing	Knowledge should be shared, must happen as openly as possible (legislation by politicians) (7)	Research results should be published (4)		
		Let researchers tell a little about their research, and then ask the public to contribute with what direction the research should continue towards (4)		
Ethics	Autonomous weapon systems: who is to teach the systems to learn? Should it be a human crew in the end? (2)	Ethical rules + sets of rules for when research is done on mice / rats / monkeys / humans (3)		
	How will politicians ensure an ethical/moral boundary for the project? (14)			



	How are you going to ensure that the research does not get off track? i.e. take another direction than the one “commissioned” (16)			
Involvement (Danish: inddragelse)			Organisations should participate together with professional knowledge about XYZ subjects/topics (Danish: emner)	
Economy	How will politicians account for spending 1 billion euro on the project? (1)			Pays (0)
Weighting civilian military purposes (interfaces)	How will you weight civilian / military purposes? (3)			

Table 4

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Ethics	What ethical considerations could be established to avoid abuse of the research results? (14)			Should we improve Man’s abilities just because we can? (14)



	Establish ethical rules for reading the minds of unconscious people (0)			Citizens. What do you want to buy? (0)
	How do you integrate the “humane” aspect in the technology? (11)			
	It is problematic to think that you can predict the future based on digital data (1)			
Frameworks for research and development	Where is the industry? (3)		Where are the researchers located? Are we excluding some? (1)	How far should we go? When is enough enough?
	We should be aware that we do not sacrifice privacy in favour of surveillance (3)	We should research into what separates us from a possible future autonomous AI (0)	Is it naïve to define a project as civilian? (3)	
		We should rethink the methodology of natural sciences, so it becomes more inclusive. (0)		
		We should not try to control peoples’ psyche or emotional life (2)		



Table 5

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	How can you ensure that the human with its natural “core”, which can act freely, is actually well-informed about and can make qualified decisions whether to or not to participate / let be helped / medicate in relation to new research? (14)	Do utilized results affect the free will? (can we decide for ourselves?) (5)	What is “normal” (should people be put in boxes)? (5)	What is a normal / abnormal human being? Who should be “helped”? (12)
	Researchers should be consulted when laws are passed (3)			
	Could research be abused by ill-willed? Can we tolerate that North Korea uses it? (1)			
	Who should prioritise in relation to the economy? (17)			
	How do we maintain discussing pros and cons of new neuroscience in a way that includes influence on non-measurable, qualitative humane values in the discussion? (3)			



Table 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
People's enlightenment (3)	Why isn't there more information/debate in society about HBP, when it is so vast/expensive and affects all? (7)			How can the popular /democratic influence on the research and its results be maintained? (1)
				Appeal to the individual citizen to take stand on these ethical / moral dilemmas, which are not directly political ... but questions of opinions (Danish: holdninger) (1)
Ethics and morals (3)	Who takes responsibility? (13)	Is The Danish Council on Ethics involved in HBP? Or is it the individual researcher's ethics/morals that is applied? (2)		
	When increasingly involving modern technology, who is responsible for the executed action / consequence?	Researchers: what ethical guidelines could your results		



	Machine or human? (1)	transgress? (0)		
	The Danish Ethical Council: The Danish Ethical Council should be bigger and more visible in the daily news and have bigger weight in political decision-making processes (1)			
Ejerskab af forskningsresultater (0)	Who has ownership of the research results? (16)	Who has ownership of the research results (1)	Who has ownership of the research results (5)	Who has ownership of the research results (2)
Ownership of research results (0)		How do we ensure that research supports civilian purposes for the benefit of ordinary people in the EU? (1)	Stakeholders: Pharmaceutical company (Novo Nordisk): Would you use the research to develop medicine? (0)	
Cooperation (0)	Politicians: What criteria should a partner meet? (7)			
Information (1)		Information. What is it for? Impacts? (0)		



Table 7

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	<p>P: Legislation about ethical?</p> <p>B: Presentation about ethical? (1)</p>	<p>Research ethics (1)</p>	<p>Should pharmaceutical companies be more open about their research areas? (5)</p>	<p>How do we ensure the individual characteristics and the right to have these in a future where the human brain is 100% mapped and controllable? (12)</p>
	<p>How can the population's insight into what is researched and what it is used for, be secured? (7)</p>	<p>Should ethical control be implemented in connection with Human Brain Project? And in that case, who should the "panel" be? (0)</p>		<p>How can the population's insight into what is researched and what it is used for, be secured? (3)</p>
	<p>Who controls what purposes the technology is put towards? (3)</p>			<p>Who, in the future, is to define what constitutes sick/deviant behaviour? (12)</p>
	<p>What guidelines are necessary to protect research results? (2)</p>			<p>Civilian / military cooperation in the EU under HBP auspice</p> <ul style="list-style-type: none"> Should we do that, when the US is going the other way and we want to cooperate? (0)



	<p>Should the basis for decisions be changed as to whether a given research area in HBP could also be allowed to include military purposes? (1)</p>			
	<p>What ethical rules should the researchers / organisations working with the subject observe? (15)</p>			
	<p>Civilian / military cooperation in the EU under HBP auspice</p> <ul style="list-style-type: none"> • Should we do that, when the US is going the other way and we want to cooperate? (0) 			



Annex 2.4 – Results from morning survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

(mark the answers that you agree with the most with an X)

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (choose one option)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
4	13	8	5	1

- 2) If publicly funded research have dual use potential, should it then be allowed? (choose one option)

a. Yes	25
b. No	1
c. I don't know/do not wish to answer	5

- 3) As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? (choose one option)

a. Yes, the most important thing is to make progress in the research.	5
b. Yes, but only if it is based in another EU member state.	0
c. Yes, but only if it is based in an allied country of the European Union	1
d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons	15
e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.	8
f. I don't know/do not wish to answer	2

- 4) The European Commission has big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? (choose one option)

a. Yes	21
b. No	6
c. I don't know/do not wish to answer	45

Annex 2.5 – Results from afternoon survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

(mark the answers that you agree with the most with an X)

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence or military purposes?

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
4	17	6	4	2

- 2) If publicly funded research have dual use potential, should it then be allowed? (choose one option)

a. Yes	28
b. No	2
c. I don't know/do not wish to answer	3

- 3) As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

(choose one option)	8
g. Yes, the most important thing is to make progress in the research.	2
h. Yes, but only if it is based in another EU member state.	1
i. Yes, but only if it is based in an allied country of the European Union	16
j. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons	5
k. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.	1
l. I don't know/do not wish to answer	

- 4) The European Commission has big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential?

(choose one option)	27
a. Yes	3
b. No	2
c. I don't know/do not wish to answer	



Annex 3: Country Report – United Kingdom



Human Brain Project

Citizen's View on Neuroscience and Dual Use

[United Kingdom]

Authors/Compiled by:

Reema Patel



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Summary of results

31 citizens convened in London, Vauxhall, based in the United Kingdom on Saturday 3rd March, with a view to deliberating for a full day on the ethical and social implications of dual use of the findings from the European Commission funded Human Brain Project. The day involved informing citizens about the issues that arose, engaging in small group and large group (plenary) discussions, as well as prioritising and identifying key questions for the Human Brain Project to address with a view to engaging citizens in deeper dialogue about these issues. This report summarises the findings, methodology and next steps of that workshop.

Areas where there was consensus:

- **Inequality of power and control; a sense of increasing centralisation:** There was significant interest and engagement on the issue of dynamics of power, inequality and control over the transparency and use of data through initiatives such as the Human Brain Project. Strong themes that emerged consistently throughout the day was the sense that inequalities of and increasing concentrations/centralisation of wealth and power between citizens, states and corporations posed a series of systemic barriers to the ethical use of information and data gathered through initiatives such as the Human Brain Project (and that these would need to be addressed if issues raised by dual use were to sufficiently respond to people's values and concerns).

- **Lack of transparency and secrecy:** Many citizens felt that a significant barrier enabling more ethical approaches to the use of information was (oftentimes) the inability to hold organisations (whether military or intelligence) to account for their use of the information – primarily because of issues relating to such organisations' approach to maintaining secrecy for public security reasons. Many citizens felt that *organisations that sought to realise the public interest* such as M15, GCHQ and M16 (UK security services) faced a genuine tension between need to maintain a balance between outcomes that secured public security in the common/collective interest; and the need to use data and wider information in a manner that protected people's individual rights and liberties. Most participants felt they did not trust their sources of information about these issues - participants raised concerns about the nature and quality of information available on how military and security service organisations conducted their affairs. And many were critical of the extent to which (oftentimes) media reporting lacked balance on the socio-ethical implications of neuroscience, and an ability to promote a more informed dialogue between citizens and such institutions.

- **Appetite for greater public education on, and a strong interest in public engagement on these issues:** Other citizens felt that these issues meant there was a strong need for corporations, military and defence organisations as well as security services to undertake more anticipatory, early stage research and innovative public engagement; in a manner that allowed them to both better understand public values on the use of neuroscience data in an informed fashion but without necessarily taking a 'mass-communications' based approach to the engagement. Citizens indicated that they had enjoyed the day (and had not necessarily thought they would have such a strong interest in the application and use of neuroscience – but had discovered in actual fact that they had *both* an interest in, and desire to continue to engage with institutions on these issues).

On dual use in particular, citizens recognised similar but also distinct issues in relation to *corporations* that might be contracted to use and apply such information in the public interest (e.g defence companies or contracted companies to provide military services to nation states). Similar questions arose – particularly around the tensions between such organisations maximising profit, seeking to maintain shareholder value



and maximise shareholder gain; and such organisations' incentives to ensure sufficient transparency and protection of people's rights to their own personal liberty and privacy.

Areas with less consensus:

The extent to which dual use itself is an ethical issue: Some citizens felt that focusing on the question of *dual use* itself did not sufficiently address the question of whether the technology/data used was an ethical use of that technology or data; whereas other citizens *did* feel that it mattered as to whether information was inherently used in a military or a non-military context. It was noticeable that many citizens did 'push back' against the idea that 'dual use' was the ethical issue per se, but rather felt that dual use brought to starker light ethical issues that might apply in a non-military or intelligence based context as well; numerous citizens cited examples of technologies that had been developed with a military purpose in mind; but had in fact been applied in domestic contexts to secure significant public benefits; and numerous citizens also cited examples of technologies that had been developed with purely domestic purposes in mind, which had then been applied for a military purpose. Examples of such technologies included the microwave, the atom bomb. A number of citizens saw the potential for positive application of such technologies in both a military/non-military context; as well as negative applications of such technologies in both contexts; 'we cannot have a hard line or border between military and civilian use,' argued one participant. However, other citizens felt that the *purpose* for which such data was used was inherently an important question – and a number of other citizens opposed the use of this data to advance developments in a military contexts (often because of the serious implications of such uses for e.g loss of life, fracturing foreign policy, or because, in some very specific instances, of a general values or faith-based opposition to the use of warfare itself).

Bias- Citizens also expressed a variety of views on the kinds of ethical issues that arose in relation to both domestic/military applications of such technologies that they felt warranted examination. These included concerns relating to inbuilt or implicit bias of such technologies (that the use and application of neuroscience in a military context might inadvertently use datasets that discriminated against particular groups or individuals) – some citizens seemed to feel that this was more of an issue than others. **Predictive accuracy of technologies:** Some citizens felt that there were concerns with using neuroscience data that aimed to make predictions and assumptions about the human condition when that in and of itself was a complex condition – 'we evolve, shape and change rapidly as persons,' said one participant. However, others thought that the ability of technologists to interrogate sufficiently large data sets might be more accurate and more able to understand the likeliness of human responses than the types of cognitive biases exhibited by individual decision makers and humans.

Results from Round 1: Research and Dual Use - Overall principles

The general opinion on dual use was that, inherently, the ethical issues that arose were not necessarily restricted to dual use; but often that dual use made those ethical issues more stark. Examples were provided where dual use had resulted in significant benefits to civilians – but also where dual use had led to unintended/unforeseen consequences (the atomic bomb was cited as an example). Most citizens felt that the issue of ‘dual use’ was less of an issue than other issues – such as who had access to the information and who did not, the purpose to which the technology or data was likely to be used, how transparent and ethical the use itself was, and potential risks/the kind of harm that might ensue if the technology was misused and/or got into the wrong hands. Very few participants felt that dual use was completely unacceptable in any given context. However, most participants gave strong caveats and conditions around which they felt dual use might be more permissible:

Issues and similar themes which came up consistently across the groups included the following: Access to such technologies, the lack of transparency in military and non civilian contexts was raised as being problematic, as well as the need to secure individual human rights such as the right to privacy and the right to know how personal data was being used. They expressed a desire for greater impartial information and engagement on the ethical questions arising, as well as to see that research and development in this space had a clear risk framework, boundaries and recognised/managed for the potential for harm to citizens. A number of people raised questions around uncertainty and trust – people felt that the purpose for the use of such research was often unclear, and that in itself generated uncertainty and contributed to declining trust in organisations who may wish to (legitimately) use such information to prevent terrorism, address other security concerns, or in a military context. Areas where there appeared to be some difference in opinion between the group included:

- The extent of risk and uncertainty about how data/information is used in the future
 - the kind of balance to be struck between anticipatory, upstream, slow and deliberative innovation; and the benefits of rapid innovation that could accrue (especially with dual use) – how free of oversight should developers be?
 - How acceptable dual use itself was (people had very different/polarised views on this one).
 - The extent to which there was risk of harm to people and society through allowing dual use
- Many participants described feeling uncomfortable about the HBP collaborating with organisations and initiatives that received funding from military and defence organisations (particularly those not based in the European Union). They stressed the importance of clear frameworks and boundaries around the actual use of that information should it be shared, as well as a way to effectively enforce any abrogation/breach of those boundaries. They recognised that in many contexts, including foreign policy contexts, it might be necessary to share information across boundaries to tackle global problems and to keep citizens safe; as well as to also pool resources to avoid overlap . However, they stressed that such information and access to such information/dual uses might easily be transferred and misused by other organisations, corporations and persons who are responding to incentives other than the social good of particular groups of people.



Results from Round 2: three areas of research

Provide an analysis of the results from round 2 in the United Kingdom. One for each area, and one crosscutting with issues, concerns, hopes and dilemmas that came up across the area subject.

Medicine

Strong themes from the groups included the potential of such developments in medicine to improve the quality of life of people, especially those who had suffered in a military environment. They recognised the potential advances had to promote greater independence and agency for those people; as well as to tackle mental health problems that arose (e.g PTSD) as a result of experience of warfare. Some people also spoke about the benefits for animal welfare as well as human welfare. They expressed hopes that developments would help with earlier, more preventive and more accurate diagnoses. People stressed the economic benefits as well – leading to a more able workforce for longer, which would be beneficial for companies and governments hiring employees.

However, dilemmas and concerns also raised focused on money and affordability – not everyone would necessarily be able to benefit and access advancements. Many people raised concerns that advancements would demand people to become ‘homogenous’, with less tolerance and acceptance of natural human diversity and disability. Many people raised moral, religious and ethical questions about tampering with human bodies too extensively or profoundly; as well as questions of agency (not wanting to reduce humans to experimental guinea pigs, or to robots). And a range of people raised concerns about unintended side-effects that might result in e.g emotional suppression or harm to people’s psyches.

Artificial intelligence (computer learning)

Strong themes within these groups included the extent to which the use of AI could help develop the efficiency and cost-effectiveness of military and intelligence services. Many people also felt that they could support a more discreet form of counterterrorism and security than those that often existed (which felt very threatening e.g police forces at demonstrations and rallies). A number of citizens also highlighted the extent to which they felt such initiatives were capable of more rational and reasoned decision making under pressure through the use of deep learning.

However, ethical dilemmas and concerns that were raised focused on the potential loss of human freedom and lack of responsibility arising as a consequence of handing decision making over completely in such environments (who should we blame if/when things go wrong , especially if decisions are irreversible as they often are in military environments?). There was strong concern that the data the AI would be trained on was at real risk of bias and discriminating against certain groups in military contexts. Many people were worried about the risk of hacking and leaks of personal and potentially dangerous data in the wrong hands. Others raised the question about the dependency culture this might create – in turn leading to lowering levels of empathy and humanity in military & intelligence contexts. Many people also questioned the extent to which taxpayer money would/should be paying for such developments at a time of deep constraints on the public purse for civilian use.

Brain-computer interfaces

Numerous groups cited Stephen Hawking's support as an example of brain-computer interfaces leading to developments for a person's quality of life, but also wider society through supporting people to make the most of their human potential. They recognised that BCI could help amputees and others suffering in a military context to recover and to regain their freedom/agency going about their daily lives. Many people also highlighted potential cost benefits in military contexts by reducing expenses through creating lifelike simulations of military environments; as well as its ability to help soldiers improve their responsiveness and decision making through being trained in such environments. They felt it promoted greater efficiency, saving time; as well as a better quality of work (reducing the need e.g for soldiers to do quite as much hard manual labour) – allowing for them to spend more time thinking/being more creative. Many people also highlighted the way in which BCI could help address mental health issues such as PTSD, psychosis and flashbacks.

However – dilemmas and issues raised included the risk of poor accuracy; serious concerns about what this meant for privacy and intrusion into people's minds and thoughts; as well as how this information and technique could be used by organisations that did not aim to secure the broader public good. Numerous issues around consent, who can access the information and the conditions under which it could be shared were raised. Many people were concerned about whether such approaches could be used to repress memories or to distort people's sense of reality and 'normal' – through, for example, normalising violence. People also expressed concerns about how reading patterns might lend themselves to fallacious interpretations and judgements of people's minds and thoughts.

Cross-cutting

Cross cutting issues included:

- The need to secure a balance between realising cost-benefits, better efficiency of services and improved quality of life against the potential harm and damage that may arise as a result of dual use.
- The need to manage the pace of innovation so that ethical concerns could be addressed alongside development rather than immediately after development and dual use .
- Striking the right balance between supporting those injured, unwell and disabled, and allowing for a future in which homogeneity, intolerance and inacceptance of diversity and disability was permitted.
- Reducing humans to robots themselves – without agency, responsibility, ability to consent, hold decision makers to account, influence and control the world around them.
- Inequalities of power, money and access resulting in differential social outcomes based on priorities set by the very wealthiest in society.
- The need to respect and protect individual human rights – especially the right to consent and the right to privacy.



Results from Round 3: Questions to address in the future

The groups were asked to prioritise and to identify key questions to be addressed by a wide range of stakeholders, including researchers, policymakers and citizens. These were the top ten questions of the numerous aimed at a breadth of stakeholders that they identified and selected:

1. Determining the limits and the purpose for which such technologies are used (Where do you intend to take this and where are the limits?) – Policymakers and researchers
2. Money, finance and tax (who pays for this, and how?) – Policymakers and researchers
3. How can citizens have a more informed sense of input and influence? – Policymakers and researchers
4. What input do we have as citizens, and how accountable a framework exists for ensuring we understand and can challenge? – Citizens, and other stakeholders including civil society
5. Risk – How do we best ensure that risk is managed in a way that secures beneficial outcomes for people and society? – Policymakers and researchers
6. Risk: What is the risk that emerges here, and how will you manage the risk? (Researchers)
7. What sense-check/approaches will you use to make sure that you know whether something is causing harm or not? (Policymakers, politicians and researchers)
8. What is the source of a common morality around such approaches when our societies are so different? How do we find a shared common ground? (Citizens, and stakeholders, especially civil society)
9. Inequality of power – how will you stop being part of a system that distributes power unequally? (Policymakers, researchers and stakeholders including companies and industry)

The kinds of questions raised focused largely on the subject of discussion throughout the day – questions of protecting human agency, responsibility, accountability and control in what increasingly felt to many like an area that lacked certainty as to its consequences (now and in the future). Citizens wanted to see clearer answers as to what decision making frameworks companies, developers and policymakers would be using to determine the right way to develop, invest in and then manage the potential risks around certain technologies. Many citizens also asked intractable questions – linking the need to agree a common set of standards to some of the challenges around human morality (which many argued was subjective). Many people felt there was a deeper need to develop a shared set of values and common basis for morality (see question 3). There were specific questions around the use of information about individual people – as well as people’s right to access that information about themselves; and a desire to access more information and education about the social implications of technologies.



Key themes present across rounds

Most participants recognised that further developing the application of neuroscience, and sharing information in a way that supported its development had enormous potential to benefit human beings and wider society. The majority of groups and citizens felt that pursuing innovation in this area for social good outweighed and was greater than the risk of not pursuing that innovation at all more generally – however, the group was very clearly split on whether that was really the case with dual use in a military and intelligence context. On that issue, there was very little consensus. Whilst people recognised the potential for greater harm/damage arising as a result of use and application in a military and/or non-military context, some people felt that there was not much of a distinction between the ethical concerns that came up in a civilian context with the use of such technologies; and those that came up in a military/intelligence context. Some citizens also felt that the question was less about whether dual use was acceptable – and more about the purpose to which those technologies were used, the intended and actual outcome, and who they aimed to benefit. The areas that formed the subject of most debate and discussion included:

- The level of trust people had in institutions to use the information they had gathered for the benefit of wider society (some people had much more trust, others significantly less trust)
- Whether it was appropriate for military and intelligence organisations specifically to make use of information that was developed for non-dual use.
- The extent to which the government/state should intervene and demand regulation and oversight (some people felt that there needed to be a slower, more careful pace of development; others felt that time was of the essence to realise the full benefits of innovation)
- The right kind of balance that needed to be struck between people's personal rights and liberties; and the wider societal interests (e.g counter terrorism and security – again people had very different views about how much they trusted intelligence organisations and military organisations to strike that balance.)

Many people recognised that there were often different, sometimes subjective moral responses to some of these questions, and flagged that it would be important to try to build some common ground across these in order to address such questions. As a result, participants found these forms of engagement (public dialogue) especially valuable in brokering such conversations – there was much consensus of wanting to see more of such approaches in understanding how institutions should respond to the issues raised by dual use.

Demographic profile of participating citizens

The workshop was hosted in London which is the most well connected and diversely populated city in the United Kingdom. As such, we had a diverse sample from which to recruit citizens – which is reflected in the mixed makeup of the demographic group who attended on the day. London is also a city that experiences significant inward migration – a number of London residents are originally from rural areas and towns, as well as EU migrants, which also contributed in part to the balance of the group. However, younger citizens are overrepresented in London, with fewer older citizens living or travelling into the city (and adverse weather conditions for older citizens also contributed to the slightly lower numbers for those older). It is worth noting that a large majority of London citizens voted to Remain in the European Union; with a higher proportion voting to Leave in the North East, North West and Wales in particular. However, this issue of regional difference in attitudes to the European Union would have arisen wherever we hosted the workshop across the UK. We did not seek data from participants on which way they voted in the EU referendum, but it may be helpful for future similar workshops in the UK although would of course need to be treated with absolute sensitivity.

Data on the participating citizens:

Age:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
18-29:	7	6	(20%) 13.6% UK
30-39:	4	4	(14%) 13.1% UK
40-49:	7	7	(22%) 14.6% UK
50-59:	9	7	(22%) 12.2% UK
60-69:	5	5	(16%) 10.8% UK
70 - :	2	2	(6%) 11% UK



Gender:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
Women:	16	15	45% (50% UK)
Men:	18	16	55% (50% UK)
Other:	N/A	N/A	Approx 56,000 (not statistically significant) estimated transgender people registered in the UK. Hard to make reliable estimate on the basis of current data but this would be 0.09%

Education	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
Primary and lower secondary education:	4	4	13% (22% UK)
General upper secondary education :	6	6	19% (22% UK)
Vocational Education and Training:	10	9	29% (31% UK)
Bachelor or equivalent:	12	10	32% (18% UK)
Masters or equivalent:	2	2	7% (5% UK)
Doctoral degree or higher:	0	0	0% (2% UK)

Geographical zone (percentage of population living in...):	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
City:	15	15	48% (49.4%)
Town:	16	15	48% (33%)
Rural:	3	1	4% (17.6%)



Other aspects of relevance in your country?

This workshop had a good spread/diversity of people from a variety of ethnic groups (the UK is a particularly multicultural region). Approximately 15% of the UK is black & minority ethnic in origin; we had a representation of almost 19% of the group from a black and minority ethnic background.



Annex 3.1 – Translated templates from round 1

BLUE TABLE

What do you think about the fact that neuroscience can be used for military or intelligence purposes?

- Who should make the decisions? That's the real question
- Could potentially have beneficial but also harmful side effects – anything can be good or bad
- Good example is atomic bomb (nuclear power could be wielded in different ways to different effects)
- Concern that information could get into the wrong hands e.g other less benign foreign states beyond the EU and be misused in a military context

Is this problematic or reassuring?

- Problematic to some extent – government organisations and other institutions are often made up of individuals with their own agenda.
- Important that citizens have choice and free will over every piece of emerging technology, and yet that is incredibly difficult. Can foresee (e.g use of microchips by government to track/identify citizens) which may start out being relatively benign.

What concerns you about the use?

- Concern that people often do not resist intrusive behaviour/abuse of rights until it is too late (passivity/fatalism of many citizens to push back really requires more sensitivity)
- Addressing power imbalances and trust – flags the importance of both as we are trusting our lives to those we do not know (problematic in some respects, esp with the American and Chinese collaboration examples).
- There need to be clear boundaries and parameters around the use of such information (these could be geographical but also entrusted to/by specific government organisations)

Does it make a difference where/who uses it?

- Lack of clarity as to the terms and conditions under which such information is being used. Where do we begin with defining those terms?
- Intergenerational point – young people often don't think about the harmful effects in the longer term future. I'm older – and wish to slow the rate of change down because I've seen the effects it often can have.
- Lack of transparency and accountability –it does make a difference; how would I know how my data is being used and be able to prevent that from happening?
- Yes it does – my human rights and others' human rights must take priority and precedence (respect for life, liberty etc)



RED TABLE

What do you think about the fact that neuroscience can be used for military or intelligence purposes?

- Could be used to prevent war, less damaging to people's lives (technological warfare), more pre-emptive warfare
- However, could be used to be more damaging and problematic for people in non civilian approaches too.
- Could help with preventing terrorism, help soldiers to cope with risk of torture (training and development); withstanding extreme conditions and so on
- Could also help soldiers to better withstand PTSD and improve soldiers' capabilities in warfare.

What concerns you about the use?

- money – intended for civilians, but could be deployed towards psychological warfare
- transparency – hard to know what military organisations are using this for
- medicine – could be used for entirely the wrong reasons/purpose
- data protection (consent and permission); could it be used to aid trafficking or kidnapping?
- Potential failures of the technology could harm soldier/military officials' safety.
- Concerns about the potential for misdiagnoses
- Racial profiling

Does it make a difference where/who uses it?

- Yes it does make a difference – different if it is used to help the mental health of soldiers or others, than if it is used to kill people/advance military strategy.
- Concern that the concept serves as a smoke screen for being truly transparent about the issues
- Worries around racial profiling (is it possible to be able to ensure the data is free of bias?)
- Terrorism – could serve to further terrorism in the wrong hands
- Are we working with something we don't understand the implications of, and developing things too fast?



GREEN TABLE

What do you think about the fact that neuroscience can be used for military or intelligence purposes?

- Has benefits – can overcome negative effects of war (harm, disproportionate violence etc)
- Can help better understand how such approaches can be used to combat diseases
- Can make war easier, however – disincentivise peaceful outcomes/treaties and so on
- There is a danger in knowing too much – may lead to unfair advantages
- If the sole purpose of research is war, there may be an imbalance that arises as a consequence
- Concern that investment in military is driven by other financial/corporate incentives (is this for the common good?)
- Might these approaches be used to target different groups/cause greater strife and division? Concern that there is a drive towards the survival of the fittest
- May make conflict safer, more effective – and result in less collateral damage; but could also make conflict itself less personal without human connection (legitimising it?)

What concerns you about the use?

- Potential impacts could be destructive and result in more power to the wrong people
- We should try to understand weak points from the start – and try to intervene pre-problem
- It is not clear who owns the research in such contexts and therefore who is able to use the research (who has the right?) as well as in what way.
- In war there are serious negative implications that arise (attempting to eradicate brain defects or short circuit people's decision making has the potential to go very wrong)
- Concern that we are stopping research (just in case) – can't just stop the research just in case.
- If this can be used to good effect in counter-terrorism it can result in a better approach to prevention rather than escalation of military conflict.
- Concern that these approaches could get into the wrong hands (terrorists, rogue states etc)
- Worries about stereotyping at a young age (scanning young minds at an early age to determine their life chances, for example).

Does it make a difference where/who uses it?

- The military exists to protect civilians if well intentioned – unclear that we need to draw such a hard distinction (military is currently doing a good job – some level of trust in the organisation).
- If this can be used to good effect in counter-terrorism it can result in a better approach to prevention rather than escalation of military conflict.
- Concern that these approaches could get into the wrong hands (terrorists, rogue states etc)
- Important that there are clear procedures for consent of the use of data, accountability mechanisms and clear checks.

**YELLOW TABLE**

What do you think about the fact that neuroscience can be used for military or intelligence purposes?

- Uneasiness, discomfort and worry about its control
- Need for self protection but it is uncertain in how it could be applied
- Want to know/understand more about the consequences

What concerns you about the use?

- Innocent people are first in the line of fire as a result of this use
- Need a better understanding of who loses as a result
- Unclear/uncertain how such approaches will work, what it will do
- How can citizens influence or make change happen? Secretive – how can citizens be fully informed?
- Trust – don't trust that powerful organisations always do what they do for the right reasons

Does it make a difference where/who uses it? (e.g counterterrorism)

- Yes – counterterrorism purposes are more justifiable from a preventative perspective. However there still remain concerns around mistakes – the risk of identifying or targeting innocent civilians and suspects; as well as how suspects are treated (trying to avoid mental torture). Important that there are ethical frameworks for processes and its uses.

The use of information by other organisations (USA/China):

- Makes me uncomfortable – important to try to place boundaries around the use of the data by US/Chinese organisations. Should be used (wherever it is used) to keep people safe; it is important to pool resources to avoid overlap but also to recognise that those resources could be misused in other hands who have other incentives.



Annex 3.2 – Translated templates from round 2

BLUE TABLE, Artificial Intelligence

What are the positive aspects of this development?

- Efficiency – can save time and in instances, can help save lives if applied in the right way
- Can help advance human conditions and luxury
- Can improve citizens' quality of life – AI can do things for us so we have more human and enjoyable lives
- Can help make better decisions that are more informed and take into account needs of the majority

What are the negative aspects of this development?

- Taking away your freedom to make decisions; affecting human skill e.g soldiers' skills
- May deprive you of enjoying tasks you may actually enjoy undertaking/feel pride in undertaking
- There is always a risk of human error and misjudgement, even in the use of technology
- Risks around hacking/data leaks and so on
- Concern that we are creating a dependency culture through such change
- Computers often lack empathy and might make very different moral decisions to those humans may make; humans should make the final decision.

What dilemmas does this development create?

- Right balance between using the technology to effect good, make people's lives better, and the risk of it being hacked or being misused in some way. That it might undermine humans' agency in the long run, and fail to reflect our moral and ethical concerns and choices. Who has responsibility?

Do benefits outweigh the costs?

- In general, yes, the benefits do outweigh the costs but there need to be clear parameters around how the technology is used – and people should have more transparency about it. More ability to challenge its use and application is important.



BLUE TABLE, Medicine

What are the positive aspects of this development?

- Improved quality of life
- Mind over matter – the invention of developments that might improve people’s independence and agency
- Effectiveness in being able to tackle and prevent decline in people’s mental health
- Interaction between state and military developments can help to benefit more people

What are the negative aspects of this development?

- Money – it’s usually a case of what people can afford, so worry that developments will cause differential power imbalances. Often medicinal development takes a long time and lots of investment to reach the majority of the UK population
- Fear of moving towards a more homogenous society (wanting to make everyone the same/fix everyone)

What dilemmas does this development create?

- Concern that we are creating and shaping a less accepting/tolerant society through developments that may be seeking to not accept people’s own diversity; but see real benefits in such advancements.

Do benefits outweigh the costs?

- The benefits do outweigh the negative – it is worth the risk for the sake of human and personal progress. But it is important to try to manage these risks (risk management is key).

**RED TABLE, Brain-computer Interfaces**

What are the positive aspects of this development?

- Example of Stephen Hawking's development a good example of the use of a BCI – made significant advancements to human knowledge and helped improve his quality of life
- Life is made easier for amputees who learned how to use new limbs and would not need to rely on drugs quite as much through the process
- Lifelike computer games have serious implications for military efficiency – could improve this and reduce costs
- May help improve people's ability to learn and respond in certain circumstances (e.g under pressure)

What are the negative aspects of this development?

- Potential lack of accuracy and effectiveness from BCI
- Potentially high risk of manipulation by other organisations/agencies
- Concern that uses and applications to repress of memory might have seriously negative implications for people and society
- Concern that realistic simulations can promote/support greater violence in society and the distortion of people's realities (resulting in poorer mental health)

What dilemmas does this development create?

- Worries around attempts to influence/control human minds
- The data sharing implications are profound – data about humans shared without sufficient consent and used without sufficient consent.

Do benefits outweigh the costs?

- The benefits do outweigh the negative – it is worth the risk for the sake of human and personal progress. But again, important to have in place the frameworks that slow down the rate of change so that it is managed in a way that helps people rather than that harms people.



RED TABLE, Medicine

What are the positive aspects of this development?

- Contributing potential to improved animal and human welfare
- Improved research into niche diseases that might be able to cure more people at lower cost
- More accurate preventive measures and diagnoses
- Allows us to use much more of our brains and maximise its human potential

What are the negative aspects of this development?

- Meddling with God's will? No united morality seems to exist – who is in control here?
- Morality as subjective; we could unintentionally do serious harm and damage to others
- We need to understand better what is good for our society and where our priorities lie before developing

Dilemmas and trade-offs:

- We need to develop tentatively/carefully – worry that harm could be irreversible otherwise
- Are we creating a human ideal instead of accepting people's disabilities and diverse identities?
- Are we excluding groups of society (e.g. civilians) who cannot afford medicinal care?
- ‚Just take a pill and live a robotic lifestyle‘ – worrying repercussions for what it means to live a truly human life.

Do benefits outweigh the costs?

- Yes – more so with medicinal benefits, but there need to be clearer frameworks in place to ensure that people are protected and there is not potential abuse and misuse by wrong parties. We need to find ways to ensure consent for the use of HBP data as well – that doesn't appear clear enough.

**GREEN TABLE, Artificial Intelligence**

What are the positive aspects of this development?

- Deep learning can lead to more objective and critical decision making
- Can be used to understand and detect the extent to which civil unrest is likely
- Able to exercise influence and control without threat – e.g police presences are often seen and perceived as a threat. Can reduce spending on police forces – allocate funding more efficiently, and better elsewhere.
- We might feel safer if AI could help us predict a terrorist attack.

What are the negative aspects of this development?

- Relies too heavily on the accuracy of the data – it could be fed in with bias
- Concern that location specific information could be inaccurate (with garbage in and garbage out)
- Costly, expensive – who has to pay for this? From our extra taxes?
- How do we stop the AI (feels irreversible)

Dilemmas and trade-offs:

- AI can't decide for us what priorities and choices are most important – we have to do that. Are we delegating important decisions for us to something else? Need to avoid narrow programming focusing on one goal to the exclusion of all else
- Entrenches further inequalities – those countries with greatest need for this less able to afford it? Which countries and nations would benefit?



GREEN TABLE, Brain-computer Interface

What are the positive aspects of this development?

- Time saving, more efficient, more likely to make more accurate decisions?
- Greater potential to tackle and address criminal and anti-security behaviour without witnesses in place
- Can help soldiers and others to reduce their reaction times – that might potentially be better, as well as to make significantly better decisions in difficult and challenging circumstances.

What are the negative aspects of this development?

- Could promote mind-based torture; a very complex ethical area
- Could enemies access your mind? Problematic issue?
- Interpretation – fact v belief – issues with potential to access and interpret thoughts.

Dilemmas and trade-offs:

- How do you limit what you find out about human thoughts and areas of focus – invasion of privacy is a big problem.
- How do we seek proper, informed consent about the use of data in such instances?
- Worries around the escalation of warfare (using BCI) – doesn't actually address the need to de-escalate and avoid conflict wherever possible.
- Does this reduce our agency and ability to make choices that we are responsible for?

Do benefits outweigh the costs?

- Do not find the benefits outweighed the costs – feeling that there were significant issues with the ethical problems raised (consent, clear boundaries around the use of information and data more generally). They thought the ability of other organisations to access human minds in particular was intractable/problematic.



YELLOW TABLE, Brain-computer Interface

What are the positive aspects of this development?

- Improving the quality of people's life and well being
- Independence of people with disabilities especially those who have suffered in military environments
- Saves money for a number of people
- Simulations can be useful to military training
- Employment and innovations promotes greater quality of work and creativity
- Can help people who suffer from PTSD/psychosis/flashbacks

What are the negative aspects of this development?

- Tech alone is not enough – decision makers make a huge collective difference and being clear about purpose (what is acceptable and what is not) is essential.
- People often do not trust that interventions/tampering in your head can be beneficial (could be very intrusive; e.g repression, tampering with memory etc)

Dilemmas and trade-offs:

- Amputees important to consider and allow for other needs e.g support aside from 'fixing' the person
- Cost – austerity and underfunding has potential to lead to greater inequality (who will be able to afford it? Who benefits?)
- Physical enhancement of soldiers - but also risks around transforming humans into robots.

Do the benefits outweigh the costs?

- Not clear that they do (at present) but with the right reassurances, framework, processes in place – they may well do so. There is much more work needed before that arrives – as well as clear boundaries around how fast/intrusively such approaches develop. Consent is also key – what approaches to consent will be deployed?



YELLOW TABLE, Medicine

What are the positive aspects of this development?

- End animal testing?
- Increase the country's workforce – healthier for longer which is better for government and companies
- Increased precision and accuracy in diagnosis

What are the negative aspects of this development?

- Risking humans as guinea pigs (especially in experimental phases)
- New side effects? Emotional suppression, longer term effects?
- Uncertainty around the kind of harm that could be caused to citizens

Dilemmas and trade-offs:

- Will we all be transformed into robots? Issues around human dignity and what makes us human.
- Worries that there will be parallels with the risk of venomous/poisonous substances developed inadvertently and harm/damage to person.
- We learn at our own speed – does this mean building a superhuman workforce at the expense of the human person?

Do the benefits outweigh the costs?

- This group felt that the benefits (safely developed and applied) did outweigh the potential risks and costs – this was different to their sense about BCI. Public health for humans and animals are given a greater weighting in the trade-off than issues of efficiency/effectiveness with AI/BCI.



Annex 3.3 – Translated templates from round 3

Key themes & questions suggested by the Blue Group:

*'Stakeholders' were defined by the groups as inclusive of:

Trade unions, civil society, other campaigning networks, defence and military organisations and companies; also politicians in the EU.

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Determining the limits and the purpose for which such technologies are used	Where do you intend to take this and where are the limits? (26) Aimed at policymakers	Where do you intend to take this and where are the limits? (13) Aimed at researchers		What do you think the purpose is for tech? Aimed at 'Joe Bloggs' – member of the ordinary public
Transparency of the use of such approaches – information on these issues should be shared	How will you share information on these issues? (5)	How will you share information on these issues? (2)		What do you want to and need to know? (6)
Ethics	Responsibility and accountability (who is responsible and accountable?) – some said everyone is. (0)	Responsibility and accountability (who is responsible and accountable?) – some said everyone is. (0)	Responsibility and accountability (who is responsible and accountable?) – some said everyone is. (0)	Responsibility and accountability (who is responsible and accountable?) – some said everyone is. (2) What is the source of a common



				morality around such approaches when our societies are so different? How do we find a shared common ground? (8)
--	--	--	--	---

Key themes & questions suggested by the Red Group:

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Money, finance and tax (who pays for this, and how?)	Who should pay for this, and how? (19) Aimed at policymakers	Who is funding these developments and to what extent does this funding align with people’s and society’s interests? (2)	What are people and society’s interests? (4)	What are people and society’s interests? Who should pay for this, and how?
Accountability	How can citizens have a more informed sense of input and influence? (16)	How can you get citizens to participate more in research?	Total lack of transparency – how do we know more about what is going on/how civil society will be affected? (6)	What input do we have as citizens, and how accountable a framework exists for ensuring we understand



				and can challenge? (8)
Mission & purpose of the project and organisations involved	Why and to what purpose is this being developed, who will benefit, and who will lose out? (aimed at regulators/government etc) (0)	Why and to what purpose is this being developed, who will benefit, and who will lose out? (4)	Why and to what purpose is this being developed, who will benefit, and who will lose out? (aimed at corporations) (3)	

Key themes & questions suggested by the Green Group

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Risk	What is the risk that emerges here, and how will you manage the risk? (14)	How will you know if you are overstepping the boundaries of what is acceptable? (17)	Preventing risk from damaging people and making sure any risk taken benefits people – how will you do this? (0)	Preventing risk from damaging people and making sure any risk taken benefits people – how will you do this? (0)
Equality	Inequality of power – how will you stop being part of a system that distributes power unequally? (recurring q) (4)	Inequality of power – how will you stop being part of a system that distributes power unequally? (2)	Inequality of power – how will you stop being part of a system that distributes power unequally? (7)	Vulnerable and powerless, and poorer people – how can we make sure that everyone, not just those with the time, can benefit and



				participate?
Monitoring and regulating the use of data and technologies so that serve social good	<p>What sense-check/approaches will you use to make sure that you know whether something is causing harm or not?</p> <p>(13)</p> <p>Things are changing quickly – how will you make sure you protect citizenry? (0)</p>	<p>What sense-check/approaches will you use to make sure that you know whether something is causing harm or not?</p> <p>Getting ethical input before, not after you've made the system. How will you do it? (3)</p>	<p>What sense-check/approaches will you use to make sure that you know whether something is causing harm or not? (aimed at corporations) (0)</p>	<p>Is there something we can do as people to oversee or given ethical sense check on the use of data? How can we be empowered to? (2)</p>

Key themes & questions suggested by the Yellow Group:

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Mission and purpose	<p>What are your priorities for this work? What do you want to achieve through it? (11)</p> <p>Aimed at policymakers</p>	<p>What are your priorities for investment, and developing these tech? Do you know where it is going to go? Do you want to? (8)</p>		



<p>Indirect discrimination and bias</p>	<p>How are you preventing this from being used to harm people? (9)</p>	<p>How can we be reassured that the development will not be used against and to the disadvantage of different groups in society? (4)</p>	<p>How can we be reassured that the development will not be used against and to the disadvantage of different groups in society? (aimed at companies mainly) (6)</p>	
<p>Privacy and personal data</p>	<p>Safeguarding of important personal and non-personal information from being hacked and/or used to wrong or non-consensual purposes – what measures exist to prevent this? (9)</p>	<p>How do I get to ‘opt out’ if I want to really ‘opt out’? (5)</p>		
<p>Access</p>			<p>Will civil society and other groups get to access the data and make sure it works for people? (3)</p>	<p>What can we all do to make sure all groups can access the benefits in society? (7)</p>



Annex 3.4 – Results from morning survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

(mark the answers that you agree with the most with an X)

- 4) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (choose one option)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
8	6	3	14	0

- 5) If publicly funded research have dual use potential, should it then be allowed? (choose one option)

- a. Yes
- b. No
- c. I don't know/do not wish to answer

13
9
9

- 6) As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? (choose one option)

- a. Yes, the most important thing is to make progress in the research.
- b. Yes, but only if it is based in another EU member state.
- c. Yes, but only if it is based in an allied country of the European Union
- d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons
- e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.
- f. I don't know/do not wish to answer

6
1
1
6
6
11

- 5) The European Commission has big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? (choose one option)

- a. Yes
- b. No
- c. I don't know/do not wish to answer

11
5
15



Annex 3.5 – Results from afternoon survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

(mark the answers that you agree with the most with an X)

- 2) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (choose one option)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
4	7	2	12	6

- 3) If publicly funded research have dual use potential, should it then be allowed? (choose one option)

- a. Yes
- b. No
- c. I don't know/do not wish to answer

18
6
7

- 4) As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? (choose one option)

- a. Yes, the most important thing is to make progress in the research.
- b. Yes, but only if it is based in another EU member state.
- c. Yes, but only if it is based in an allied country of the European Union
- d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons
- e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.
- f. I don't know/do not wish to answer

9
4
5
9
4

- 5) The European Commission has big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? (choose one option)

- a. Yes
- b. No
- c. I don't know/do not wish to answer

13
7
11



Annex 4: Country Report - Germany



Human Brain Project

Citizens' view on neuroscience and dual use [Germany]

Authors/Compiled by: Antoine Vergne and Manuel Goehrs



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Summary of results

The participants are ambivalent where it concerns the development of brain research. They consider this at once as a possible opportunity and as a source of risk. It is difficult for them to make up their minds, as they often lack sufficient information and would like to know more about the topic. The participants feel that the subject is connected to fundamental questions about society: what type of living and working conditions and which value system are desirable, and what should be the future of capitalism? They also feel that decisions are taken elsewhere or have already been taken when it comes to the place of artificial intelligence in their lives. They are very concerned about the potential misuses of neurosciences and recommend the establishment of independent commissions in order to control future developments.

Most consensual issues relate to the positive aspects of brain research in the field of medicine. There is also a large agreement on the opposition to the military use of brain research. All participants think that it is crucial to define efficient procedures to control artificial intelligence. They consider that brain research includes the risk of a wide range of possible abuses and believe that further research requires a clear legal framework.

The most heated debate was caused by the question of the use of brain research for security matters, e.g. the fight against terrorism. A majority fears possible violations of fundamental rights (privacy, physical integrity, etc.). A minority argues that neurosciences can help in tracing terrorism.

Another debated issue was the question whether the reduction of working hours is an opportunity for the quality of life. Some participants see the possibility to spend more time for family, social life and creative activities, while some others reply that the lack of professional activity include the risk of passivity.

Transparency was another contested issue. Participants could not agree on the question whether total transparency should prevail or if it is necessary to keep dangerous information secret?

Results from Round 1 – Research and Dual Use - Overall principles

The general opinion is that dual use is problematic: it is unfortunate, but it cannot be prevented. Participants are rather opposed to it, but are resigned and consider that it is happening already and will happen anyway. Some argued that military research is necessary as long as you have a Military. Others consider that military research is dangerous per se and that civil research is more important.

The point was made that information should not be hidden and that transparency should prevail. However, control measures should exist and exceptions should be made, to limit access to potentially dangerous information.

The consequences of dual use came up across the different groups. All groups discussed the risk of abuse of research results, which they consider dangerous for humanity: mass surveillance, manipulation, torture, intrusion into the human psyche, reinforcement of authoritarian regimes, loss of freedoms. The participants fear that dual use of neuro-sciences would ease warfare through the overcoming of moral barriers and lead to an increase in military interventions.

The question of military use of research for defence or counter-terrorism provoked heated discussions. Participants dislike the way in which the question is formulated, for being elusive and not mentioning the police. They consider counter-terrorism as a bottomless pit, an ambiguous concept, that may legitimate any kind of policy. A few participants argued that the use of neuro-science can help in the fight against terrorism.

There is a need for more regulation. Neuro research must occur within a clear legal framework and be subjected to concrete control procedures.

Participants are rather opposed to any collaboration with organisations and initiatives funded by the Military or Defence agencies. Such collaboration would violate the engagement of the HBP not to conduct military research. Again, participants underlined the risk of abuse. They suspect that financial dependency influences the orientation and the results of projects. More funding should be made available for civil research and less for military research.

However, they stated that cooperation is preferable over competition: more resources would lead to more results. They also argued that the possible positive commitment of the Military has to be taken into account as well. Another argument was that a general ban does not make any sense.

The question was asked whether we need more innovations or if we can satisfy ourselves with what we already have.

Most tables had the same reasoning. It should be noted that the presence of two former soldiers at two tables influenced discussions. The outcomes were consequently less critical at these tables.

Results from Round 2 – three areas of research

Medicine

The most positive aspect participants see in the development of neuroscience in the field of medicine is that it allows more precision in the early identification and in the treatment of illness, while at the same time provoking less side effects. However, they regret that neuroscience only addresses the symptoms and not the causes of illness. Another positive effect mentioned at almost all tables is that computer simulation will stop animal and human testing or at least allow a significant decrease of the latter. Participants also think that, in a best-case scenario, neuroscience will help to increase the equality of chances: with cheaper products, medicine would no longer be a luxury.

Participants are greatly worried about their working environment. New developments in medicine would lead to the creation of so-called super-humans, or proper working machines, that are able to work two days in a row and can be simply switched off. New medicine would thus contribute to the development of an “achievement society” and to the decrease of self-determination: in the name of efficiency, people may become inhuman. Participants feel threatened by a possible limitation of their freedom of opinion, but also by the standardisation of behaviours, and a certain manipulation of the mind. Homogenisation would lead to a collective depression.

In the field of the Military, participants fear the development of so-called fighting drugs, that would decrease moral barriers and/or enhance the potential of aggressivity. They wonder if it is possible to ethically regulate military research.

At two tables, participants raised the question as to whether unlimited development of medicine is desirable, arguing that “weaknesses make us who we are” and that the existence of individual personalities requires life experience. Participants are concerned that research money goes to medical treatment only, instead of funding alternative treatment as well.

Generally, participants are concerned by the values that underlie research (efficiency, achievement). For them, research should address the fundamental conditions for a healthy life (including family life and creative output) first.

They said that the risk of abuse is too high: where a medical objective is generally viewed positively, brain research can also lead to many abuses. The unpredictability of research results necessitates to reflect on possible damages.

Artificial intelligence (computer learning)

The simplification of everyday life is valued very positively. If „senseless“ jobs disappear, people would have more time for their social life, family life and creative activities. On the other hand, the disappearance of jobs and a lack of activities (without new social life ideas, like a 15h working week, unconditional basic income, etc.), could contribute to a lack of meaning, as self-realisation often happens through work. The development of AI would also help in medical issues, and especially facilitate the integration of disabled



people. Participants also say that AI will help resolve unresolved questions, for instance dismantling atomic waste, tackling the consequences of climate change, although AI could possibly also mean the creation of new sources of energy consumption. Some participants consider AI as a positive development in preventing terrorism. Another positive aspect is a faster and more precise treatment of larger amounts of data, although this last point raised the question of the purpose of big data and provoked vehement reactions.

According to the participants, data collection primarily aims at the increase of consumption. Generally, they consider the narrative of our world today problematic. AI would imply the end of human manpower and of human thinking; comfort and dependence would lead to “stupidity”, and contribute to the falling apart of society. Furthermore, the question of the control over AI is very sensitive. At all tables, participants asked if AI can be trusted, and shut down in a worst-case scenario. Participants fear the possible superiority of machines, as robots lack feelings and empathy. AI is also seen as a means for generalised surveillance, possible manipulation and the loss of anonymity. Researchers should guarantee that AI acts in the interest of human beings. Besides, there should be more reflection on who carries the responsibility, for instance for an automatic Stock market or autonomous weapons. AI technology would introduce new social schisms due to an unequal power division through AI tools.

As more dependence on technology would contribute to the loss of values, participants wonder if we need more AI. If machines replace human beings, what is the *raison d'être* of the latter? To what extent do we want to develop AI and when are AI programs good enough?

The authorship of algorithms was another issue that was raised: those who write algorithms will also define who will be controlled and who not, decide on military actions, etc.

To the participants, negative aspects outweigh the positive ones. The latter are rather trivial in comparison to the risks of abuses. The question here is how negative consequences can be curtailed. The fundamental questions of control over AI mechanisms should first be cleared, before research goes too far.

Participants are generally very concerned that AI takes over human intelligence leading to the powerlessness of the human kind. Only one group clearly defended more research in AI.

Brain-computer interfaces

For participants, most positive aspects are to be found in the field of medicine: prosthetics following an amputation, the enhancement or recovery of the senses (vision, hearing), etc. However, new technology should be restricted to the mere preservation of life. Intrusion in the process of creation and the prolongation of life are seen as a loss of reality (“playing God”). They also suspect that in the presence of new technologies, handicaps would no longer be acknowledged as such, possibly increasing social injustice if positive discrimination would cease to exist.

Participants fear that the development of brain-computer interfaces makes humans irrelevant or transform humans into cyborgs. They view the further development of an “achievement society” negatively. They especially consider the possibility of reading minds, manipulation (brain washing), hacking computers and brains risky. They are concerned by the standardisation and de-individualisation that brain-computer interfaces could imply. “Normalisation in accordance with the average” would lead for instance to the



exclusion of non-achievers or anti-capitalists. Some participants said that they prefer being ill and part of society than computer-driven and efficient.

Participants wonder if these developments are not taking place too soon. In their view, society must be intact before it can take further steps in the field of neuroscience. They feel that brain-computer interfaces go too far. Brain-computer interfaces would contribute to a loss of values and self-determination: people would no longer know what is normal, what is healthy.

Here again, the question of control is crucial. Participants would like to know what is the objective of the research and who is responsible for such interfaces (who saves and shares data)? In particular, they are worried that commercial use might outweigh the welfare of people. They would not mind the use of new technologies in recruitment procedures, provided that this remains limited to positions with a high level of responsibility.

Participants consider that positive aspects might take over if negative aspects are curtailed. The preservation of the free will and the right to secrets are conditions for the further development of research.

Participants are concerned by a risk of loss of human identity and a risk of curtailment of thoughts and the freedom of opinion. They agree on the idea that research loses interest in diseases to the benefit of the „efficient“ human being.

Participants are especially concerned by the fact that many problems cannot be identified yet. Participants recommend to establish ethical commissions.

Cross-cutting

Participants expressed their hope that brain research would help to achieve more precision and efficiency in medicine. New medicine, AI and brain-computer interfaces would have positive effects on medicine: early diagnosis and treatment of mental illness, new types of prostheses for disabled people. In a best-case scenario, the development of neuroscience would improve everyday life. People would have more time for family and creativity, provided that society provides sound living and working conditions. To some extent, neuroscience would reduce social inequalities, by making medicine more accessible.

The purpose of research however remains unclear to the participants, as they are worried about the potential abuse. New medicine could be used to create super humans. The vast majority of participants view general surveillance very negatively. The processing of big amounts of data for security matters, political manipulation or brain washing would lead to a loss of human identity. Big data could also serve commercial purposes, and lead to more consumption, the standardisation through the average and the exclusion of non-achievers.

The development of brain research thus raises the question of the model of society that people want. Participants argued that dependence on technology involves passivity and “stupidity” and should be discouraged. They wonder who is responsible for the development of AI, who writes the algorithms, who is responsible for actions undertaken by machines. The possible abuses of research raise the question of its limits. Participants wonder if our society needs to go this far.

Negative aspects are considered more important, unless curtailment allows the positive aspects to outweigh the negative ones. To the participants, the question of control over AI has to be cleared before research goes any further.



The control over AI is the main concern expressed. Participants want to be sure that AI will contribute to the welfare of human beings. They fear the possible superiority of machines, as robots do not have emotions and lack empathy when taking decisions. Another concern is if it will be possible to shut down AI. Participants worry that the development of brain research implies the loss of freedoms at different levels.



Results from Round 3 – Questions to address in the future

1. Examination of AI and its consequences.

Theme: n/a; **Actors:** n/a; **Number of votes:** 4

2. Development of a strong value system

Theme: n/a; **Actors:** n/a; **Number of votes:** 4

3. Economy and politics should always refer to ethics.

Theme: n/a; **Actors:** Policy-makers, citizens; **Number of votes:** 3

4. Identity/ what is it to be a human being?

Theme: n/a; **Actors:** n/a; **Number of votes:** 3

5. Should society return to a non-technical way of life?

Theme: n/a; **Actors:** n/a; **Number of votes:** 3

6. Protection of the private sphere and personal data.

Theme: n/a; **Actors:** n/a; **Number of votes:** 3

7. Citizens must be included. How?

Theme: n/a; **Actors:** n/a, [stakeholders]; **Number of votes:** 3

8. Establishment of independent commissions: control over research, transparency, exchange between research community and citizens.

Theme: n/a; **Actors:** Policymakers, citizens; **Number of votes:** 3

9. What control procedure? What degree of transparency in the Military and intelligence services

Theme: n/a; **Actors:** n/a, [Citizens]; **Number of votes:** 2



10. More participation in the definition of research funding.

Theme: n/a; **Actors:** n/a; **Number of votes:** 2

11. Global Justice.

Theme: n/a; **Actors:** n/a; **Number of votes:** 2

12. Luxury problem of the rich industrialised countries.

Theme: n/a; **Actors:** n/a, [Policy-makers, Stakeholders]; **Number of votes:** 2

13. What is a good life?

Theme: n/a; **Actors:** n/a, [Researchers]; **Number of votes:** 2

14. What and where are the limits? Who sets them?

Theme: n/a; **Actors:** n/a; **Number of votes:** 2

15. How can we guarantee that applications that benefit society are more important than potential risks (innovation has to be made available to everyone, no commercial use, for global society)?

Theme: n/a; **Actors:** n/a; **Number of votes:** 2

The questions which got the most votes are **essential questions** pertaining to the meaning of life in society (ethics, system of value, identity, return to less technology).

Another type of question relates to the **juridical aspects** of artificial intelligence (violations of fundamental rights, control mechanisms, transparency)

These questions relate to the feeling of powerlessness expressed by participants across the rounds: the opportunity to conduct research is not discussed as such. Considering that both Politics and research communities have already decided that artificial intelligence will be a central part of our societies anyway, participants would like independent Ethics commissions to be put into place to control further developments.



Key themes across rounds

The major point that was made across rounds and tables concerns the risks of abuses. In all three rounds, participants agree on the need to establish control mechanisms and independent institutions, able to conduct ethical evaluations on both the opportunity to open new fields of research and on possible uses of research results.

The goals of brain research were generally questioned: is it all about enhance the quality of life, create super humans or super soldiers, reinforce capitalistic consumption pattern or develop mass surveillance?

The most heated discussion was held on the possible use of neuroscience in the war on terror, a concept that is associated with negative political motivations on the one hand, and regarded as a necessary security issue on the other hand.

All participants agree on the need to guarantee the control over artificial intelligence. Policy-makers and researcher have the responsibility to ensure that, when put into place, it serves humanity.

There also was a broad agreement on the fact that brain research can have positive effects on medicine.

Demographic profile of participating citizens

Data on the participating citizens:

Age:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
18-29:	12	10	14,2%
30-39:	7	4	11,8%
40-49:	6	3	16,6%
50-59:	4	5	14,5%
60-69:	2	2	11,1%
70 - :	0	0	15,4%

Gender:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
Women:	18	11	51,2%
Men:	14	13	48,8%
Other:			n.a.



Education	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
Did not complete school	0	0	3,8%
At least ten years of school and received a diploma	13	11	20,5%
Vocational Education and Training:	7	4	58,3%
Highest education is university	10	9	15,0%

Geographical zone (percentage of population living in...):	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
City (100 000+):	24	18	31,0%
Town (10 000+):	5	5	42,4%
Rural: (10 000+):	1	1	26,6%

Other aspects of relevance in your country?



TABLE 1, Template 1

Annex 4.1 – Translated templates from round 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- The equipment of the Military is necessary, as long as you have a Military.
- That the use provokes strong awkwardness is another point.

Do you find it problematic or reassuring? Please explain (why/why not).

Problematic:

- Risk of a misuse
- Less people getting more power (hacker paralyses services)
- Psychological barrier decline
- Possible reinforcement of authoritarian regimes
- Resources could be better used for civil purposes

Reassuring:

- Security in case of a cyber attack
- Awareness of people and perception on inventions change by future generations

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Developments could lead to military interventions, prior to interventions of Human Rights organisations and civil society

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- Yes and no
- Disagreement in the group
- It depends on the method



TABLE 1, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that

- Yes , with reservations

work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- Cooperation can produce better results, since more resources can be spent.
- Possibly positive commitment of defence agencies
- Consequences of such projects are unpredictable; Attention must thus be paid on how research is conducted. Procedures should be subjected to Human Rights Convention (Risk of people manipulation / mass manipulation)

Please explain why/why not.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at

- General prohibition does not make sense, since it is no action

the same time do military funded research?

Please explain why/why not.

- Yes, it would lead to wider research results
- Provided research remains in the legal framework
- States must be informed of research developments and possible human rights violations



TABLE 2, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- Should be prevented

Do you find it problematic or reassuring? Please explain (why/why not).

Problematic:

- We do not want more wars
- We are against Military research because it's dangerous
- Other uses as those planned are abuses

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- It should be used not only for but also against the people: manipulation (only by the Military?)
- It only serves some States and people (not all): drifting away from Global thinking
- Lack of freedom of the Human will through AI
- It eases warfare through the overcoming of moral barriers

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- No,
- It would affect innocent people anyway
- First, use all other means, then at most the Military. Where does legitimate purpose start?



TABLE 2, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- No
- Or yes, with reservations

Please explain why/why not.

No:

- No support of armament research
- Risk of abuses (for instance atomic bomb)
- Do we really need more innovations?

Conditions:

- Transparency
- Control measures are needed
- Only fundamental in research
- Ethical

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research? Please explain why/why not.

- No

Please explain why / why not?

- Funding should be made available for civil research in place of military research
- Need to create incentives for not-military research



TABLE 3, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- Transparency is important, but with exceptions, so that not everyone has knowledge of dangerous informations
- Regulation!
- We do not think nothing of it
- Yes and no: people are namely against, but this happens anyway.

Do you find it problematic or reassuring? Please explain (why/why not).

- Worrying would be more appropriate than problematic
- Well-being of people should be the main focus (Humanity)
- Humanity does not apply to the Military

ETHIK

- For the humanization of the Military (contradiction in the terms?)
- Humanity?
- Civil use before military use

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Control, doping, robbery of freedom of opinion, manipulation
- Abuses (we consider it like this): torture



Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- No,
- Dangerous question, suggestive question
- Police is not mentioned?



TABLE 3, Template 2

As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese

- No
- Would contradict the first sentence.

“China Brain Project”?

Please explain why not.

- No

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at

- New findings should not be used by such organisations. Knowledge transfer cannot be impeached
- Incentives needed for organisations conducting no military research

the same time do military funded research?

Please explain why/why not.

- Financial dependences influence the choice of and the results of projects; Finance thereby has full access to research
- It is important that civil society has access to military research (Military serves citizens, not the opposite)



TABLE 4, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- Unfortunate, but you cannot prevent it.

Do you find it problematic or reassuring? Please explain (why/why not).

Problematic:

- Lost of control (where are we moving to?)
- Intrusion into the human psyche (lie detector, mind reading, programming)

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Control, surveillance of the society (becomes gradually/rapidly more, like state of emergency in France)
- Lost of control+ external determination
- Much more complex...
- Contrast between superficial mechanisms and concrete procedures



- NO!!
- Where does Defence start, where does it end?
- What are the limits
- Bottomless pit
- Counter-terrorism is a universal label, meant to legitimize anything

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?



TABLE 4, Template 2

As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- No / Yes: 40/60

Please explain why not.

No:

- Ethical, moral claims
- Imbalance: Is transparency evaluable?
- Dismantling/development of principles
- Regulation is impossible, how?

Ja:

- Transparency/ Control
- Gain in research results
- Hard to prevent anyway
- Cooperation is better than competition

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?



- No / Yes: 60 / 40

Please explain why/why not.

Really depends on the type of organisation

No:

- Money transfer instead of Knowledge exchange
- Difficulty regarding the signal that is sent (international conflicts?)

Ja:

- Unavoidability of information exchange
- Influence/ co-determination



TABLE 1, Medicine

Annex 4.2 – Translated templates from round 2

What are the positive aspects of this development?

- No more animal testing
- Precision in the diagnostic
- Biological understanding of the body, e.g. brain: treatment of mental illness

What are the negative aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • Intervention occurs too early, or is wrong • “Work horses”: humans work 48h in a row and feel no tiredness • Humans can get calmed down /shut up like machines 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • War drugs / Fight drugs
--	--

What kind of dilemmas will this development cause?

- Use of new medicine depends on wealth: only „rich“ people can afford the newest medicine/research
- Possible misuses
- Humanity get lost through the loss of feelings (psyche)
- Medicine makes profit over individuals

Do the positive aspects outweigh the negative? Or vice versa?

- If all diseases could be treated, wouldn't social problem emerge, like overpopulation, or would there be a self-regulation?
- Personality develops through “bad” times (one shouldn't heal from depression within a week)
- Proper „I“ must be preserved

Are you concerned that this kind of research/development is carried out?

- yes and no
- Not concerned by research per se, but by its applications
- Cannot people treat themselves without medicine?



TABLE 2, Medicine

What are the positive aspects of this development?

- New medicine and diagnosis
- Thanks to computer simulation, Medicine won't have to be tested on animals or people anymore
- Illness prediction when they still can be healed

What are the negative aspects of this development?

Civilian applications

- Computer stimulated brains will most probably not function like human brains
- Only symptoms are addressed, not their cause
- Constant increase of our „achievement society“
- Decrease of self-determination (Therapies, medicines)
- Prediction of diseases when they affect the life of a person significantly

Political, security, intelligence or military applications

- Military research: people become inhuman in the name of efficiency and the freedom of opinion is limited

What kind of dilemmas will this development cause?

- Is it at all possible to understand and stimulate the brain?
- Which kind of diseases legitimate a cure with neurological medicine?
- Can the soul also be healed and recognised?
- Is it possible to ethically regulate military research?
- Does possible cure legitimate soldier's traumas

Do the positive aspects outweigh the negative? Or vice versa?

- No!!!
- The risk of misuse is too high!
- No, as long as research does not start to address the fundamental conditions for a healthy life
- Maybe, if the people are properly informed

Are you concerned that this kind of research/development is carried out?

- Ja, if the values (efficiency, achievement, etc.) that drive research are not changed
- If there is no reflection on the greatest possible damages. What missions does research have?



TABLE 3, Medicine

What are the positive aspects of this development?

- Precision
- No more animal or human testing necessary (or at least diminished)
- New treatment possibilities
- Less side effects

What are the negative aspects of this development?

- Optimisation of objectives that we cannot defend
- Standardisation
- Misuses

What kind of dilemmas will this development cause?

- „A healthy human being has only been badly examined“
- Ethical ambiguity

Do the positive aspects outweigh the negative? Or vice versa?

- Negative: optimisation
- Positive: health

Are you concerned that this kind of research/development is carried out?

- A little worried, especially where the military is concerned



TABLE 4, Medicine

What are the positive aspects of this development?

- Prevent the suffering of people
- Affirmation of better medicines
- Differentiated Diagnosis

What are the negative aspects of this development?

- (The Lie that depression and psychological illness can be healed with medicines)
- Research money only goes into medical treatment and no longer in alternative treatments (psychotherapy)

What kind of dilemmas will this development cause?

- Soon a Super human → achieving, 100% working machine!!!

Do the positive aspects outweigh the negative? Or vice versa?

- Difficult to predict

Are you concerned that this kind of research/development is carried out?

- Yes and no



TABLE 5, Medicine

What are the positive aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • Cure more people • Less side effects • More prevention • Cheaper products • In the best case: more equality of chances, health is no longer a luxury • Jobs 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • Enhancement of the life of soldiers
--	--

What are the negative aspects of this development?

<ul style="list-style-type: none"> • Causes of diseases are not treated • Enhancement of medication is an illusion • Pressure for the perfect human being – individuality • Intrusion in nature – where is the limit (colour of eyes, sex of the child)? • Manipulation • Decrease of barriers • Potential of aggressivity

What kind of dilemmas will this development cause?

<ul style="list-style-type: none"> • Limits/ regulation of medical developments • Everyone is the same (weaknesses make us what we are) / collective depression through homogenisation • Symptoms/causes of diseases!
--

Do the positive aspects outweigh the negative? Or vice versa?

<ul style="list-style-type: none"> • Negative aspects are more shocking / fatal → no balance • In medicine, there are more positive aspects (access first world, third world/ equality of chances...) • Conditions are important • The question is difficult to answer
--

Are you concerned that this kind of research/development is carried out?

<ul style="list-style-type: none"> • From which point onward do we have too much medicine? • Medicine is a positive label – problematic → manipulation, intrusion in nature



TABLE 1, Artificial Intelligence

What are the positive aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • Self-driving cars, integrates disabled people • Early identification of Alzheimer (and other diseases) • Faster treatment of big data 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • Terror tracing
---	---

What are the negative aspects of this development?

<ul style="list-style-type: none"> • End of human manpower, end of human thinking • Robots have no feelings, no empathy • Surveillance through social networks, loss of anonymity (data protection?) • Can impact negatively professional future
--

What kind of dilemmas will this development cause?

<ul style="list-style-type: none"> • Dependence on technology • Possible manipulation, abuses • Decrease of jobs leads to loneliness • Who should be controlled, who not? • There is no absolute truth: can we then still think correctly?

Do the positive aspects outweigh the negative? Or vice versa?

<ul style="list-style-type: none"> • Control measures is a condition • Clear legal framework has to be given • Negative aspects are more important than positive aspects

Are you concerned that this kind of research/development is carried out?

<ul style="list-style-type: none"> • Yes and no • AI overtakes human intelligence • Research is not worrying per se, but its extent and its direction because they remain unpredictable
--



TABLE 2, Artificial Intelligence

What are the positive aspects of this development?

- Big data can be handled
- Life can be better protected (for instance: self-driving cars)
- AI can resolve unresolved questions (for instance: dismantling of atomic waste)
- „Senseless“ jobs disappear and people have more time for their social life

What are the negative aspects of this development?

- Data = surveillance and control
- Life will not be better protected, since machines are not better than their makers
- Creation of new Energy consuming things in times of Climate Change
- The disappearance of jobs (without new social life ideas, like 15h work /week, unconditional income)
- The capacity to think can be taken away
- Development of bubbles and/or apart falling societies
- Who carries the responsibilities?

What kind of dilemmas will this development cause?

- Who writes the algorithms?
- How can we take ethical decisions?
- Can AI also be shut down (Intervention, regulation)?

Do the positive aspects outweigh the negative? Or vice versa?

- The question is how negative consequences can be curtailed

Are you concerned that this kind of research/development is carried out?

- Ja



TABLE 3, Artificial Intelligence

What are the positive aspects of this development?

- Precision
- Size of data procession
- Help in medical issues
- Climate protection and solution finding

What are the negative aspects of this development?

- Loss of values → lack of meaning?
- Data collection → for what? Consume, consume, consume → a problem with the narrative of our world today!
- Power (superiority) of machines → how can we guaranty that AI acts in our interest?
- Comfort and dependence → disease and stupidity

What kind of dilemmas will this development cause?

- Unemployment, lack of activities
- Power: who takes decision? AI can take decisions !?!
- How far will it go?
→All of this is even worst when it comes to the Military

Do the positive aspects outweigh the negative? Or vice versa?

- Negative!
→ positive aspects are rather trivial in comparison to the risks
→Military use destroys the existing system

Are you concerned that this kind of research/development is carried out?

- Yes, EXTREME BESORGT!



TABLE 4, Artificial Intelligence

What are the positive aspects of this development?

- Quick global data procession
- Facilitation of work / everyday life

What are the negative aspects of this development?

- Is AI still controllable? (for instance, automatic Stock market)
- Obstacles decrease, for instance, warfare
- When jobs are taken over, people will probably have too much time (self-realisation through work)

What kind of dilemmas will this development cause?

- Trust in machine (is critical)
- Decisions:
 - Yes/no, black and white
 - Without emotional experience of a person
- Is there still control?
- Fear of uncertainty of the developments (powerlessness)

Do the positive aspects outweigh the negative? Or vice versa?

- It is still difficult to completely determine which aspects are predominant
- The future will show which positive /negative aspects there will be in the civil and military context

Are you concerned that this kind of research/development is carried out?

- Pro research!
- Later uses are questionable

TABLE 5, Artificial Intelligence

What are the positive aspects of this development?

- Time saving: simplifies everyday life
- In the best case, more time for important things: family and creativity
- The capacity to learn through the exclusion of mistakes
- Increase of certainty

What are the negative aspects of this development?

- More stupidity through the lack of personal application
- Social “sense” questions when there is no more work
- Social schisms through unequal power division through IA tools
- Total dependence: collapse of independence
- Abuse through easier accessibility
- AI has no ethics
- Increase of control over the individual

What kind of dilemmas will this development cause?

- From which point onward are these programs good enough? When does it stop? When should people let go of control?
- Unstoppable development in other fields that influence us?
- Discovery of a global discourse
- When robots replace the human being, what is his *raison d’être*?

Do the positive aspects outweigh the negative? Or vice versa?

- Difficult question... it depends...
- Depending on the implementation
- Consensus: more critical when it concerns medicine (fundamental questions of control over AI mechanisms should first be cleared)

Are you concerned that this kind of research/development is carried out?

- Yes and No
- Ethical conditions have not been put into place and it depends on the context

**TABLE 1, Brain-computer interfaces**

What are the positive aspects of this development?

- Prosthetics following an amputation or for disabled people
- The possibility of enhance or recover human senses: vision, hearing, etc.

What are the negative aspects of this development?

- Humans become irrelevant

What kind of dilemmas will this development cause?

- It goes too far

Do the positive aspects outweigh the negative? Or vice versa?

- Civil uses are positive
- Military uses are negative

Are you concerned that this kind of research/development is carried out?

- By recruitment procedures: only for positions with high responsibility

TABLE 2, Brain-computer interfaces

What are the positive aspects of this development?

- Disabled people will be given new possibilities to move
- Achievement level will increase → discovery of new visual capacities

What are the negative aspects of this development?

- From human beings to cyborgs
- Handicap will not be acknowledged but will be considered equal
- Development to an achievement society
- Manipulation / Hacking of computers and brains
- Reading minds / brain washing
- Who's responsible?

What kind of dilemmas will this development cause?

- Where and when can research be stopped?
- What is the objective of the research, "seldom diseases" or mass diseases?
- How is misuse curtailed?

Do the positive aspects outweigh the negative? Or vice versa?

- No, better sick and part of society than computer-driven and efficient (especially psychological)
- Yes, if it's only for physical assistance, for instance bio-ethics

Are you concerned that this kind of research/development is carried out?

- There is a risk of loss of human identity
- Yes, because research seems to lose interest in diseases to the benefit of the „efficient“ human being
- Yes, there is a risk of curtailment of thoughts and the freedom of opinion
- Many problem cannot be identified yet

**TABLE 3, Brain-computer interfaces**

What are the positive aspects of this development?

- Medical use → treatment of „physical“ handicaps
- Security by precision

What are the negative aspects of this development?

- Risk of standardisation / de-individualisation → exclusion of non-achievers / anticapitalists
- Data protection + Hacking
- From which age? Loss of reality

What kind of dilemmas will this development cause?

- What is normal, what is healthy → normalisation through the average

Do the positive aspects outweigh the negative? Or vice versa?

- Nein/Ja : 20/ 80
- (The positive takes over in case of curtailment of the negative aspects)
- Condition: the free will and the right to secret
- What can be measured?
- Who saves and shares data?
- Possibly: a step back

Are you concerned that this kind of research/development is carried out?

- Ja!!

**TABLE 4, Brain-computer interfaces**

What are the positive aspects of this development?

- Mobility, better prosthetics

What are the negative aspects of this development?

- Loss of reality, playing God

What kind of dilemmas will this development cause?

- Ethical problems

Do the positive aspects outweigh the negative? Or vice versa?

- Negative

Are you concerned that this kind of research/development is carried out?

- Without an ethical commission, rather concerned

**TABLE 5, Brain-computer interfaces**

What are the positive aspects of this development?

- Preservation of life, yes, but no intrusion and prolongation

What are the negative aspects of this development?

- Invasive/not invasive
- Move away from the Creation in the natural sense
- Ethically complicated
- Commercial use will outweigh the welfare of people
- Increase of social injustice

What kind of dilemmas will this development cause?

- Inequality of chances
- Technological developments in an imperfect social system

Do the positive aspects outweigh the negative? Or vice versa?

- It depends on the regulation and the social context
- The society must be intact before the next step, are we ready?

Are you concerned that this kind of research/development is carried out?

- Yes and No
- It depends on the context



Annex 4.3 – Translated templates from round 3

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Impact assessment of further developments	Modernise education policy: explain more about research	Reflect one's own research Evaluation system: external check by researcher community	NGOs in the field: - Develop discourse on contemporary research - Point out the risk of the processes	One's own initiative
What and where are the limits? Who sets them? 2				
How can we guarantee that applications that benefit society are more important than potential risks? 2 - Innovation has to be made available to everyone - No commercial use - For global society				
Establishment of an independent commission: - Control over research (ethics commission) - Transparency Exchange between Research community and Citizens 3	Legal framework for the establishment of Commissions			Presentation of the results: communication
Citizens must be included. How? 3			Provide networks	



TABLE 2, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Ethic (not only ² medical context)	At EU and State level: create ethics commissions	Co-thinking over these questions		Civil debate must take place and be taken into account in the political decision-making process
Increase of the ¹ of war	International regulation/proscription of weapon of war (war robots)			
Luxury problem ² rich industrialised countries	UN		NGOs address the question of global justice	
Social consequences: - Exclusion of people who do not want to use AI - Exclusion of people who cannot afford it		Risk minimisation		
Environment (resources, etc.)				
Question of the "good" life: - Use of the freedoms that have been gained ³ - Unconditional basic income - Tax on machines		Regulate research / Ethics		



TABLE 3, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Politics and economics must always refer to ethics 3 2	Double use			Referendum
Instance control Transparency by the Military and Intelligence agencies				Are allowed to take part in the set-up of agendas, centralize the power of decision
Fair distribution of resources at international level (including medicine) 1				
Regulation / Commission for drones and far-reaching weapons 4				
Control over AI Consequences of AI				



TABLE 4, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Data protection private sphere 2				
Standardisation Optimisation				
Clarification of competences (who is allowed to take decisions) 3				
Question of identity (be a human being) 1				
Transparency				
Discussion on values (treatment of symptom + support of contemporary system) 2				



TABLE 5, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Return to a non-technical life 3 4				
Creation of a solid system of values 1				
Protection of human rights (private sphere) 2		In research		
Global justice				
More participation in the funding of research 2				



Annex 4.4 – Results from morning survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

(mark the answers that you agree with the most with an X)

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (choose one option)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
0	6	8	4	4

- 2) If publicly funded research have dual use potential, should it then be allowed? (choose one option)

d. Yes	9
e. No	10
f. I don't know/do not wish to answer	2

- 3) As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

(choose one option)

m. Yes, the most important thing is to make progress in the research.	5
n. Yes, but only if it is based in another EU member state.	2
o. Yes, but only if it is based in an allied country of the European Union	1
p. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons	4
q. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.	9
r. I don't know/do not wish to answer	1

- 4) The European Commission has big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential?

(choose one option)

a. Yes	15
b. No	3
c. I don't know/do not wish to answer	3



Annex 4.5 – Results from afternoon survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

(mark the answers that you agree with the most with an X)

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (choose one option)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
0	5	5	5	5

- 2) If publicly funded research have dual use potential, should it then be allowed? (choose one option)

g. Yes

8

h. No

11

i. I don't know/do not wish to answer

0

- 3) As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

(choose one option)

s. Yes, the most important thing is to make progress in the research.

5

t. Yes, but only if it is based in another EU member state.

2

u. Yes, but only if it is based in an allied country of the European Union

0

v. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons

2

11

w. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.

0

x. I don't know/do not wish to answer

- 4) The European Commission has big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential?

(choose one option)

a. Yes

14

b. No

2

c. I don't know/do not wish to answer.

4



Annex 5: Country Report - Italy



Human Brain Project

Citizens' view on neuroscience and dual use

Italy - Modena

Compiled by: Andrea Panzavolta



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Summary of results

In general participants were interested in the theme and there was a good openness and accessibility to the dialogue for all the meeting. The workshop was very useful to share information about neurosciences research in particular for laypersons. A lot of participants were sincerely satisfied to learn what neurosciences could do in the future. Even more, most of them asked clearly to continue in the next years the Human Brain Project citizens engagement activities. Some of the participants asked to receive more information about the progress of Human Brain Projects. That means, for instance, to provide the presence of the researchers in the next meeting, in order to argue and explain their point of view, or answer participant's technical questions. During the event, some participants did an evident request of more information to be able to answer with awareness to the template's question. Some others appreciated to change group after lunch because that action helped the "pollination" of ideas and information.

The majority of the participants affirmed that the research has to continue because the military use of the research it's inevitable. The ethic paradox was the most discuss issue, at the same time, there was the dehumanization's concern. Dehumanization means the drop of human relationship, like a consequences of machines and technologies increase and a less emphatic world because of the robots jobs increase. Some proposals to guarantee an ethical develop of the research were to stipulate international agreements based on ethical values or to create an international institution for protection and monitor the dual use in the neurosciences research.

A priority was to publicise the results of the research and to keep citizens informed. Participants yearn to separate military research from civil research. At least they want to guarantee that a civil research remain so, even if co-founded by military agencies. For this reason, most of the citizens asked that every country who becomes partner of a neurosciences project must respect the European Union policies.

Finally citizens were consistent about the importance of neurosciences in medical purpose to prevent and cure diseases and disabilities. At the same time, they said that it's necessary to share, here and now, rules and boundaries to manage the risks and responsibilities about future's neurosciences applications. Therefore it will be essential to propose a training program for politicians, in order to be conscious in the subject and in the relation developments. For example concerning the develop of brain computer interfaces: citizens considered this subject one of the most interesting for medical aspects and, at the same time, very interesting for military applications.

Analysis of morning and afternoon questionnaires compared to the results

The dual use and in particular political, security, intelligence and military purposes of Human Brain Project research moderately concern participants. Both in morning and afternoon questionnaire around 30 people on 36 chose answers which give a balanced position (slightly; moderately; somewhat). The main difference



between morning and afternoon for the first question appears in the extreme positions where we find an opposite result: in the morning 1 person chose “extremely concerned” and 3 people “not concerned at all”, while in the afternoon this result has been reversed: 1 person chose “not concerned at all” and 4 people “extremely concerned”.

Answers to the second question remain the same from morning to afternoon: most of participants (30 on 36) are convinced that dual use it’s inevitable, in any case the research must be allowed and at the same time it must be regulated. This is underlined also in the answers to the 3rd question where half of the group highlighted that Human Brain Project could collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, as long as they are in countries which have signed and ratified international treaties on e.g. chemical or biological weapons.

Both in the morning and afternoon questionnaires, the 3rd question show the disagreement of the other half of participants which is divided about ethical aspects related to military application of neurosciences: 8 people think the most important thing is to make progress in the research, on the contrary other 8 people clearly disagree with collaboration between Human Brain Project and initiatives organisations funded by military or defence agencies.

In general, from morning to afternoon survey, the answer “I don’t know/do not wish to answer” is declined. This aspect corresponds to participants comments at the end of the meeting. They were satisfied to be involved and informed about what neurosciences could do in the future and about the Human Brain Project and its developments.

Finally the last question confirm the template’s results: it is indispensable to public research data and analyses, also with those research with potential dual use. This action is necessary to encourage the awareness of European citizens in the field of neurosciences, in its ethical aspects and in the public choices could have a relevance for the future of the community.



Results from Round 1 – Research and Dual Use - Overall principles

People well understood what *dual use* of the research means. In general, participants were concerned about an illegal or uncontrolled use of the research results. More opinions support the idea that it's impossible to limit the research and that military use of the research it's inevitable. In addition the *dual use* could help the research to grow, collect more point of views and to gain better quality results.

The participants shared his own meaning of the word "neuroscience" and there were a lot of common ground about potential interesting developments, so underlined that it's indispensable to write "rules" about the neurosciences uses. Moreover to write and share rules for intelligence and ethical purposes of neurosciences. That also before to use neurosciences to prevent counter-terrorism purposes, because at the same time there are too much risks to an incorrect use.

Finally citizens recognised that it's very important to publicise the results of the research and to inform citizens about the progress. Some citizens affirmed that military research should be separated from civil research.

The subjects/issue that came up across the groups are: the progress is a must; ethical aspects; useful for military and civil use; difficulty of control - regulation; risks and benefits of the research; risks about political and social control.

Citizens were convinced that collaboration between the research and organisations or initiatives which receive funding from military or defence could be possible according to the following conditions:

- the project has to remain a civil project;
- publicize the results;
- guarantee a cooperation between countries;
- International agreements based on ethical values should be stipulate.
- Research's purposes and targets doesn't have to change;
- don't be in contrast with the European Union policies (ex. respect Chinese and American agencies policies).

Post it session: Which subject got the most heated discussions? - Which subject did they agree on the most?

The most heated discussion was related to this question: Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? Most of the post it's indications were about the possibility that Human Brain Project could collaborate with others research entity (research must



go on), but not with Defence Agencies. Some others have specified that Defence Agencies must be only European Defence Agencies. In this case it's necessary to put limits to the military research, in order to respect human rights and to prevent an uncontrollable technological weapons purchase.

Moreover participants agreed with the possibilities of misuse of the research results and underlined that the need of public divulgation of the results to encourage the awareness. In any case, participants agreed that it's necessary to identify a supervisory body and write a public agreement on ethical and military limits of the research uses.

The participants disagreed on ethical aspects related to the military application of neurosciences, at the same time if used for defence or counter-terrorism purposes. In relation some answers on post it disagreed to publish all the research results, but in general people thought that the dual use it's inevitable.

The citizens were in contrast if organizations that do military funded research could receive funding through the Human Brain Project for their civilian research.

Another disagreement subject was the use of technologies to increase security: who will control the controller?



Results from Round 2 – three areas of research

Medicine

In general participants underlined how the use in medicine could guarantee the invention of more specific treatments with less collateral effects. It's important to develop the interaction between medicine and computing. The positives aspects were estimate the same weight than negatives. However citizens affirmed that before to start to use neurosciences in medicine it's necessary to know well the brain map to build the right patterns. Most of participants considered as negative aspects the increase of human productivity and efficiency, the self- alteration (mass marketing of products that alter performances), that could create human less pain sensitive or emphatic so all the military aspects (soldiers' dehumanization/consider human as a machine). Finally they were concerned about unequal possibilities to access these new treatments and medicines between rich and poor people (accessibility limitation: who could take what?).

Some other dilemmas were related to ethic values, medicine dependence and to the theme of formation and information for medics and humans. Over more the post trauma treatment could be positive in case of violence, but it also could be negative if manipulate consciousness. Could this development also be used to limit the freedom of think and behaviour? So which limits of the use of airborne chemical compounds? Who determines the limits?

Participants were in agreement with the possibility to create more specific medicines which could be used to improve personal treatment, accurate diagnosis and to reduce collateral effects. Over more they underlined that neuroscience could be useful for innovative treatment of post-traumatic stress disorder and to alleviate symptoms for people with mental illnesses or neural afflictions e.g. epilepsy, depression or anxiety. Also the example to use advanced computer simulations to develop medicines, by simulating how a medicine could affect the brain, instead of using laboratory animals, has got a positive judgement by citizens. Just like the theme of disability problems resolution.

Participants disagreed with the use of new medicines or chemical substances which could make increase soldiers and humans performance, or could be used to suppress or control emotions or sensations. The same discordance came out on the theme of tranquilisers that might be developed to ease the life of people with psychological disturbances, such as ADHD. In addition they were uncertain with regard to the idea of new medicines which could improve students or employees productivity and efficiency prolonging their attention span and stamina and increasing their ability to focus on a given task for longer.

Highlights from the groups

Issues: increase productivity and efficiency; reduction of laboratory animals; improvement of physical activities; improve individual and social level; disabilities resolutions.

Concerns: increase productivity and efficiency; military aspects; manipulation of consciousness; use of dates; synthesize new types of drugs; self person alteration;

Hopes: post trauma treatment; mental illness; alleviate symptoms for people with mental illnesses or neural afflictions.



Dilemmas: ethical; military aspects; the dehumanization of soldiers; the distort use of medicines; therapeutic persecution; possibilities to influence the freedom of think and behaviour.

Artificial intelligence (computer learning)

In general participants recognised that with A.I. everyday life could be more comfortable, so people could have more free time and higher quality life. In addition A.I. could prevent neural diseases and accidents or human errors (traffic, surgery, etc..). On the contrary this could mean increase of unemployment. Finally participants agreed that information about A.I. must be shared and effects must be monitored.

Participants agreed that with A.I. daily life could be more comfortable (ex. self-driving cars, robotic vacuum-cleaners, etc...), and humans could have time with a better quality (ex. help for disables) . All groups are consistent that A.I. could prevent neural diseases (ex. halzheimer signals), create a health brain model and more, can improve security as prevent accidents and human errors (autopilot vehicles, surgery, etc...). Furthermore A.I. could help computer attack prevention (cyber security); epidemic prevention and risk prevention. Finally A.I. could be important to define and share information useful to make decision support.

Some negatives aspects are the limits of human control and the risk of low knowledge to manage these devices/machines (less faith in people which programme the algorithm of the machines). Over more A.I. could reduce the humanity and erase the human factor, giving more weight to categorization and standardization. Personal marketing nowadays is consider as a manner to revenge our personal freedom of choice. Most of participants think that the introduction of A.I. in this field could become too much intrusive and influence personal marketing and ease privacy violation.

Some dilemmas have emerged in relation to the possibility in the future of more human unemployed caused by automatic work, specifically in less creative job. The main apprehension were about the fact that more machines do, more humans unlearn to do, and human will stop to think and be autonomous. Finally some questions were left unanswered, like: How teach the ethic to machine? How save the emotional part?

Most of participant were worried about the military application of A.I. specifically related to the example of autonomous weapon systems (non emphatic machines), that can identify and engage enemy targets in combat and also in case of machines that can cooperate with soldiers by learning their behavioural patterns, habits and their inexpedient tendencies, and compensate for their inadequacies.

Highlights from the groups

Issues: standardization; personal marketing; medical aspects; ethical aspects; privacy; risk prevention; individual freedom and identity.

Concerns: a machine that could think more than a human; machine/device management; A.I. has automatic access to internet and whatever information; less humanity; prevent social and civil "right" unrest. Hopes: reductions of human mistakes (ex. Surgery, traffic, accidents, ecc...); build a pattern to recognize first alzheimer signals; improvement of life in general (ex. Help for disables); faster learning ability; road deaths number reduction.

Dilemmas: non empathic machines; privacy violation; as much as machines do, less humans learn to do; the



creation of “gods machine”; the Charter of Human Rights also for robots; the human replacement with robots; the law’s adjustment of A.I. in relation to the single countries position.



Brain-computer interfaces

Brain – computer interfaces was the most discussed arguments in round 2. In general participants were not concerned in medical developments (disease prevention, disabilities, prosthesis, etc...), but they were scared about military developments. In particular concerning privacy, information technology security and dehumanize soldiers. Citizens were worried that humans beings could become something different from what they are now. Moreover they were concerned about possible technologies malfunctions or manipulation. Thereby they need for the future more information about possibilities and evolutions of Brain-computer interfaces.

The majority of participants agreed that medical applications are the most promising (ex. illness care, information retrieval from people in vegetative state, nursing and carers, etc...). These are very linked to the improvement of life, mainly for disabilities aspects (ex. control prosthetics or robotic limbs or by a paralytic to control an external skeleton making it possible to walk, or help blind or deaf people regain their hearing or vision). Another positive aspect is the possibility to increase medical/social self-sufficiency and as a consequence to reduce social inequities. Some participants appreciated also the idea that brain computer interfaces could improve also military aspect related to civil defence, specifically against terrorism (ex. Monitoring a brain activities or analyse the state of mind of a subject in interrogations).

Most of alarming aspects concern the military field, so the issue of people manipulation, mind reading, hacking devices (ex. someone gets control over the device/brain , a soldier that couldn't feel fear or pain, etc...), and in general abused related to the new technologies (ex. exceed of privacy limit, etc). The most worries are related to informatic security and direct pulses to the human brain: a malfunction chip in the brain could compromise all the human brain? (ex. reduce reaction time of a pilot or a soldier, by connecting machines directly to their nervous system). Finally some citizens were worried about playing with virtual reality, that could create dependence and distort reality: has the risk to create two realities of life (violence and deaths not real). More, there's the possibility of a regression of human beings in social relations and emotional aspects, so someone think it's necessary to teach the use of the new technologies.

Ethical dilemmas were the most shared (ex. improvement of performances for civils: which limits and what we become?). After that there's the alienation of reality, linked to the new technological dependences. At the same time participants highlighted the doubt that technology will be accessible for whom can afford, so could generate more inequity.

Highlights from the groups

Issues: medical aspects (illness care, prosthesis, etc...); educational aspects and quality of life; privacy; alienation of reality; machine remote control; nursing and carers.

Concerns: military aspects - inhumane soldiers; could create dependence and distortion reality; testing applicants for jobs; regression of human beings in social relations and emotional aspects; imbalance from rich to poor person in prosthesis purchase; the safety of neural interfaces link to the internet.

Hopes: information retrieval from people in vegetative state; disabilities reduction; quality life.



Dilemmas: ethical; manipulation; improve of civil performances; disparity/ social discrimination to pay mechanic part, esoskeleton, etc...; religious aspects.



Cross-cutting focus from the three research examples

One of the main theme recurred across the three research examples is the “robotization or dehumanization” of human being. This theme emerged concretely with the brain computer interfaces examples, but participants talk about it throughout all the three rounds. This theme is particularly linked with ethics, but also it concern the use of “new” medicines or chemical substances that could change the actually life style, way of working, way of studying, etc... The ethic issue come to light related to the technological and scientific development and to define limits and international agreement based on ethic values.

Improvement of quality of life has been discussed cross the rounds as an hope in connection with the dilemma of alienation and distortion of reality. In particular the increase of complexity could create society fragmentation.

Even more citizens were interested and trustable in medical applications, to prevent and treat illness, neural diseases and in the possibility to improve the quality life of disabled people.

Participants were worried about all the military uses of neuroscience and also about the effective ability of humans to programme and manage the machines.

Finally one of the main discussed doubt in the three research examples was: who control the controllers of this new technologies?



Results from Round 3 – Questions to address in the future

1. Focus on medical purpose to cure diseases and disabilities (12 votes)
2. Ethic on use and abuse in neurosciences technologies (12 votes)
3. Dehumanization (12 votes)
4. Prevent information to citizens and results publicising (11 votes)
5. How will change our human relations? (10 votes)
6. International agreement for neurosciences dual use and mutual control (9 votes)
7. How it's possible to find a common ethic between so many different cultures? (9 votes)
8. Privacy (9 votes)
9. Transition of employment replaced by machines (8 votes)
10. Define a control institution (8 votes)
11. International agreement and public consultation to define ethical values (8 votes)
12. Necessary transparent communication on the research (7 votes)
13. Rules and politicians formed to manage the risks and responsibilities (7 votes)
14. Human control maintenance over A.I. (7 votes)

Reported above there are the principal issues merged and voted from the participants, however it's possible to group more similar themes/focus suggested.

Most of questions were about ethic and its boundaries. Who can define limits? How many differences between cultures approaches? A lot of discussion brought doubts on the real politicians knowledge on the



subject. Also in regard to the different countries and cultures interested by the project. So, how it's possible to govern the next neurosciences developments?

In second way the theme of public dissemination of the research's results. This means to teach neurosciences positives and negatives aspects to people, to prevent fear and inappropriate uses. The most expected results were in the medical aspects.

Participants seemed to be scared about the machines role in relation to the human role in the society (humans beings autonomy, unemployment, empathy, etc...). At the same time there was a common need to create an international institution which could protect and monitor the possible dual use of the neurosciences research.



Key themes across rounds

In the first round participants underlined the necessity of signing an international agreement on the research towards a States collaboration. The concerns regard all military aspects behind the neurosciences and the collaboration with other brain research initiatives or organisations which work for or receive financial support from defence agencies .

In the second round the brain – computer interfaces was the most discussed arguments. The theme was compared into its positives aspects (and hopes) recognised in medicine uses and for concerns about the dehumanization of the human beings.

In general participants agreed that neurosciences affront an important ethic theme. So it's necessary to improve the awareness of citizens on the neurosciences possibilities. The military use of the research it's inevitable, therefore the research has to go on according to an agreement on ethic boundaries (Who control the controllers?), effects monitoring and on the maximum dissemination of the results.

Key words: privacy, ethic, boundaries, employment, military use, dehumanization, information, medicine, treatments, regulation, international agreement, developments, independent research.

The most discussed questions were the open questions on the first round:

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

Demographic profile of participating citizens

The citizens reflect the general population in gender profile e particularly in the age groups from 30 to 59 years. Moreover the geographical configuration it's not far from the Italian especially for the rural areas.

Data on the participating citizens:

Age:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population (http://www.tuttitalia.it/statistiche/popolazione-eta-sesso-stato-civile-2017/)
18-29:	22	22	61% compared to 12,5% of national population
30-39:	7	6	16,7% compared to 12,2% of national population
40-49:	5	3	8,3% compared to 15,8% of national population
50-59:	5	3	8,3% compared to 14,9% of national population
60-69:	5	2	5,6 compared to 12,1% of national population
70 - :	0	0	0% compared to 16,3% of national population

Gender:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
Women:	22	18	50% compared to 51,4% of national population
Men:	22	18	50% compared to 48,6% of national population
Other:			



Education	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population (http://www.istat.it/it/istruzione-e-formazione e http://dati-censimentopopolazione.istat.it/Index.aspx?DataSetCode=DICA_TITPOST)
Primary and lower secondary education:	2	0	0% compared to 55,2% of national population
General upper secondary education :	22	20	55,5% compared to 26,2% of national population
Vocational Education and Training:	3	0	0% compared to 9,6% of national population
Bachelor or equivalent:	15	15	41,6% compared to 7,5% of national population
Masters or equivalent:	1	1	2,7% compared to 0,8% of national population
Doctoral degree or higher:	1	0	0% compared to 0,7% of national population



Geographical zone (percentage of population living in...):	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population (http://www.istat.it/it/files/2014/11/C01.pdf)
City:	20	20	55,5 % compared to 33,3 % of national population
Town:	14	9	25% compared to 42,4 % of national population
Rural:	10	7	19,44 % compared to 24,3 % of national population
Other aspects of relevance in your country?			
In Italy there's a big class of population with the Primary and lower secondary education (over 55%). It's difficult to engage people with low levels of education in discussion on scientific and technical arguments.			



Annex 5.1 – Translated templates from round 1

GROUP 1

Round 1: Research and Dual Use – Overall principles

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

We are concerned; the research have to continue; we think the military use of the research it's inevitable; publicise the results of the research and inform citizens; military research must be separated from civil research.

Do you find it problematic or reassuring? Please explain (why/why not)

Problematic: it's the end of individual privacy; we could have a distort future; the possibility to create new weapons that can destroy humanity; ethical problem.

Reassuring: better citizens defence; military funding will accelerate the developments for civilian use.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

It's the end of individual privacy; we could have a distort future; the possibility to create new weapons that can destroy humanity; ethical problem.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

No.

Round 1: Research and Dual Use – Overall principles

Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

We agree, on condition that:
The project will remain a civil project
The result will be publicised

Please explain why/why not?

We agree because collaboration help research.



Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

No

Yes

Please explain why/why not?

No: contamination from military purposes

Yes: with the dissemination of results (creative commons)

GROUP 2

Round 1: Research and Dual Use – Overall principles

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

Inevitable element; we have no alternative; ethical theme, not only military

Do you find it problematic or reassuring? Please explain (why/why not)

Reassuring: if the research is public is better controlled; if the research will remain in countries that share commons values (like Europe)

Concerns: if the research will be reserved/confidential will be limited medical aspects

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

We're concern that will be a connection within new military weapons. Principle concern is to control the controllers; could be more strong the possibility to dev elope military aspects than civil aspects; in A.I. there's a big area of uncertainty; hacking problems with military and medical devices.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

While prevent counter-terrorism purposes, at the same time there's the risk to a incorrect use of this technology, also against "normal" people.

To prevent *counter-terrorism purposes* some of us are available to give personal DNA samples, others no.

Round 1: Research and Dual Use – Overall principles

Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

NO: ethical aspects



Yes: it's better a cooperation between countries because it's more easy to ensure a "peer review"

Please explain why/why not?

No: we're concerned about the involvement of countries out of Nato

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Yes

Please explain why/why not?

It's important to develop opportunities for growing others areas

GROUP 3

Round 1: Research and Dual Use – Overall principles

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

We're very concerned for the illegal or uncontrolled use of this research in military area. It's difficult to provide limit once the results are public. Also because there's no legislation in regard to prevent and sanction. It's useful work on awareness of the citizens (with simples and understandable information) more than publicizing.

Furthermore military research could be useful for civil uses.

Do you find it problematic or reassuring? Please explain (why/why not)

We think it's problematic. We're concerned about the roles to "sale/share" the research's results. The same concern regard the people how works in the research (politician and researchers).

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

The control on our life and our privacy; bodily harm; the devices are to protect or to control us?; distort interpretation and consequent possible freedom of expression's limitation.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

Yes, we agree just in case of big events.

No, we disagree because the purpose of terrorism it's just to limit us.

Round 1: Research and Dual Use – Overall principles



Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Form some of us no, for others it's possible with certain conditions.

Please explain why/why not?

Yes: because could help the research to grow and to gain better quality results.

No: because the research could change purpose and targets. Moreover could be in contrast with the European Union policies, specifically respect Chinese and American agencies policies.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Yes, if doesn't change targets and purposes.

Please explain why/why not?

No: the two organizations have different purposes and targets.

Yes: could have a major control on the research.

GROUP 4

Round 1: Research and Dual Use – Overall principles

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

Extremely concerned for military uses (inevitable); we agree that a public research could be used for different uses; difficulty of control; great concern for civil use like in commerce, ecc...; it could be useful for military security use and to prevent terrorism; concerned about inequalities; it's important to stipulate international agreements based on ethical values.

Do you find it problematic or reassuring? Please explain (why/why not)

It's depend on the use; in general there's a widespread concern.

Problematic: exploitation of the research; kind of use; difficulty of control.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

Exploitation, intimidating and aggressive attitudes; exceed ethical limit; difficulty to define what is or not ethic.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?



No: terrorism is an exploitation.

Yes: it's okay to fight terrorism but without exceed ethical limit.

Round 1: Research and Dual Use – Overall principles

Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Scared about this cooperation; It's dangerous but necessary; i don't know.

Please explain why/why not?

I don't know; no faith in the defence organizations; it's possible to collaborate but it's necessary to find common ethic roles.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Not acceptable (3)

Acceptable (2)

I don't know

Please explain why/why not?

Not acceptable: exploitation for military purpose, ethical contrast; concern about military use in general; organizations with civil purpose must be separated from organizations with military purpose.

Acceptable: there's the risk to slow down the research; need control.

I don't know: i need more elements to clear my opinion

GROUP 5

Round 1: Research and Dual Use – Overall principles

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

Impossible to limit the research, the progress is a must; useful for military and civil use; there's the need of a regulation; important to understand the risks and benefits; there are risk about political and social control.

Do you find it problematic or reassuring? Please explain (why/why not)

Problematic: military use; social discrimination in the use of intellectual capacity; brain manipulation.
Reassuring: military use only if no abused (deliberate attack).

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?



Privacy: access to our dates; worried that more wars could be instigated by dates and hypothetical strategy; economical iniquity; distort use for defence; concern about A.I. and weapons without ethical sense.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

No. We're concerned about a distort military use.

Round 1: Research and Dual Use – Overall principles

Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

Yes: collaborate help opinions to change, but collaboration must be reciprocal.

No: too much different purposes.

Please explain why/why not?

Yes: progress first of all.

No: first we need to publicize all researches about A.I..

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

No.

Please explain why/why not?

No because it's different to collaborate with other research, from receive moneys; to accept we need exactly to know what is the use of the dates; it's difficult to ensure that information will publicized in a short time; who can guarantee that the military and civil project will developed at the same time and with the same emphasis?

GROUP 6

Round 1: Research and Dual Use – Overall principles

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

It's okay: as long as there are "rules"; for intelligence and ethical purposes.

No for military purposes.

Do you find it problematic or reassuring? Please explain (why/why not)

It's problematic for possible deviations, manipulation, abuse, no control for citizens.

Reassuring for increase security, legal cases resolution and for medical aspects.



What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

The possibility of a mass manipulation; creation of humanoid army (suicide); new evolved lethal weapons

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

Yes, because is morally acceptable.

No, it's dangerous from a ethical point of view.

Round 1: Research and Dual Use – Overall principles

Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Yes

Please explain why/why not?

We need rules.

Yes, because sharing information help the research to grow.

Only to accelerate the research in medical area.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

No.

Yes, for a part.

Please explain why/why not?

For ethical reason; acceptable if terrorism prevention in judicial area it's the purpose; only in medical area; in medical and military area.



Annex 5.2 – Translated templates from round 2

GROUP 1

Medicine 2.1

What are the positive aspects of this development?

More specific medicines with less collateral effects; increase productivity and efficiency; post trauma treatment

What are the negative aspects of this development?

Increase productivity and efficiency
Military aspects

What kind of dilemmas will this development cause?

Ethical; formation; information; stop the exploration of non conventional medicine

Do the positive aspects outweigh the negative? Or vice versa

We are unable to say: negative effects more heavy and a lot of collateral effects

Are you concerned that this kind of research/development is carried out?

Yes. Make simulations with no precise patterns it's dangerous; error propagation; before to start we must to know well the brain map



Artificial intelligence (computer learning) 2.2

What are the positive aspects of this development?

Daily life more comfortable; time with a better quality; prevent neural diseases and in general

What are the negative aspects of this development?

Standardization; to prevent social and civil "right" unrest

What kind of dilemmas will this development cause?

How teach the ethic to machine? ; privacy violation; more machines do, more humans unlearn to do

Do the positive aspects outweigh the negative? Or vice versa

We are unable to say: too early.

Are you concerned that this kind of research/development is carried out?

Yes: ethical aspects; machine/device management

Brain-computer interfaces 2.3

What are the positive aspects of this development?

Medical aspects
Educational aspects and quality of life
Information retrieval from people in vegetative state

What are the negative aspects of this development?

Military aspects
Could create dependence and distortion reality
Testing applicants for jobs.

What kind of dilemmas will this development cause?

Ethical
Manipulation

Do the positive aspects outweigh the negative? Or vice versa

Positive: medical aspects

Are you concerned that this kind of research/development is carried out?

Concerned about: informatics security; direct pulses to the brain; invest less in diseases prevention

**GROUP 2****Medicine 2.1**

What are the positive aspects of this development?

Improvement of treatment (personal treatment); treatment of brain problems as body problems; possibility of interaction between medicine and computing

What are the negative aspects of this development?

This is not the solution to all problems (ex. treat physical pain and not disorders confirmed by doctors); could be synthesised new types of drugs; self person alteration

What kind of dilemmas will this development cause?

The post trauma treatment could be positive in case of violence, but could be negative if manipulate consciousness

Do the positive aspects outweigh the negative? Or vice versa

Positive: health problem resolution

Negative: a mass marketing

Are more the positives.

Are you concerned that this kind of research/development is carried out?

Yes. There's a abuse risk and accessibility limitation (who could take what?). Mass marketing of products that alter performances.

Artificial intelligence (computer learning) 2.2

What are the positive aspects of this development?

Prevent accidents and human errors (traffic, surgery).

What are the negative aspects of this development?

A.I. has automatic access to internet and whatever information

What kind of dilemmas will this development cause?

Automatic work, that means more times for humans and also more unemployed

Do the positive aspects outweigh the negative? Or vice versa

Negatives



Are you concerned that this kind of research/development is carried out?

Personal marketing; machine that develop in autonomous way without human control; the creation of “gods machine” (ex. If a machine with A.I. affirm that the planet is sustainable for 2 billion people, what will be for the others? All depend about a machine’s decision.)

Brain-computer interfaces 2.3

What are the positive aspects of this development?

Cancel disability and disorders; workload reduction and more free time.

What are the negative aspects of this development?

Regression of human beings in social relations and emotional aspects. It’s necessary to teach the use of the new technologies; where it’s possible to read the mind there’s a privacy limitation; use of brain-computers for military purposes.

What kind of dilemmas will this development cause?

Alienation of reality; new technological dependences; lack of privacy.

Do the positive aspects outweigh the negative? Or vice versa

For the civilian life totally positive. For military aspects totally negatives.

Are you concerned that this kind of research/development is carried out?

Yes for military uses.

Division of perception from real and virtual world.

GROUP 3

Medicine 2.1

What are the positive aspects of this development?

Specific physical diseases cure and reduction of collateral effects; more accurate diagnosis; reduction of laboratory animals; improvement of physical activities; remove pain without removing the will or the consciousness of people that live in hospice.

What are the negative aspects of this development?



The improve of productivity and efficiency has the risk to make grow super-man or robotic-man; the differences about the possibilities that could have rich people respect poor; the dehumanization of soldiers.

What kind of dilemmas will this development cause?

The probably dependence effects that could have the medicines; the distort use of medicines for ADHD; the use of chemical weapons: what limits?

Do the positive aspects outweigh the negative? Or vice versa

The negative could be more than positive: it's a historical period with little faith in medicine. The positive and the negative weight the same, because medicine will make progress.

Are you concerned that this kind of research/development is carried out?

We have some concern, but it's not a "daily problem".

Artificial intelligence (computer learning) 2.2

What are the positive aspects of this development?

The improvement of automation (ex. Vacuum cleaner, ecc.); early diagnosis of epidemics; autopilot vehicles reduce accidents; machine could reduce inaccuracy surgery; create a health brain model; cyber security.

What are the negative aspects of this development?

The personal marketing to revenge my personal freedom of choice; less faith in autopilot vehicles; less faith in people that programme the algorithm of the machines; possible future human unemployed, specifically in less creative job.

What kind of dilemmas will this development cause?

The automatic weapons that could be used by the enemies; the law's adjustment of A.I. in relation to the single countries position.

Do the positive aspects outweigh the negative? Or vice versa

Are more the positive aspects.

The positive and the negative weight the same

Are you concerned that this kind of research/development is carried out?

Some of us are concerned, some others are not concerned but need the awareness of the aspect.



Brain-computer interfaces 2.3

What are the positive aspects of this development?

Medical use and prosthesis; use against terrorism; communicate with person in vegetative state; to civil pilot of motor vehicles; games and virtual reality.

What are the negative aspects of this development?

For military pilot of motor vehicles; the inhumane of soldiers; playing with virtual reality has the risk to create two realities of life (violence and deaths not real); imbalance from rich to poor person in prosthesis purchase.

What kind of dilemmas will this development cause?

Improve of performances for civil: what limits and what we become?: read the mind of conscious people.

Do the positive aspects outweigh the negative? Or vice versa

Are more the positive aspects.

Are you concerned that this kind of research/development is carried out?

Yes, we're really concerned because the risk is to become something different from what we are. Especially now we're in the start up phase and we don't have enough information about the possibilities.

GROUP 4

Medicine 2.1

What are the positive aspects of this development?

Civil purpose and improvement of life; improvement of individual and social level

What are the negative aspects of this development?

All the military aspects; consider human as a machine; exceed of ethic limits (human rights); therapeutic persecution.

What kind of dilemmas will this development cause?

Possibilities to influence the freedom of think and behaviour; disparity from available technology and ethical issues; what's the final result of the research?

Do the positive aspects outweigh the negative? Or vice versa



More positive, but with ethical boundaries.

Are you concerned that this kind of research/development is carried out?

Yes.

Artificial intelligence (computer learning) 2.2

What are the positive aspects of this development?

Improvement of security(personal, vehicles, ecc...);reductions of human mistakes (ex. Surgery, traffic, accidents, ecc...); improvement of life in general (ex. Help for disables)

What are the negative aspects of this development?

Limit of control; less humanity; risk of low knowledge to manage this device/machine.

What kind of dilemmas will this development cause?

Limit of control; how far could push us?; trampling of the Charter of Human Rights also to robotic.

Do the positive aspects outweigh the negative? Or vice versa

Negative 2, positive 3, undecided 1.

Are you concerned that this kind of research/development is carried out?

All concerned: 3 very concerned; 3 enough concerned

Brain-computer interfaces 2.3

What are the positive aspects of this development?

Improvement of life (principally for disabilities aspects); reduction of social inequities; increase of medical/social self-sufficiency; mind reading.

What are the negative aspects of this development?

Exceed of privacy limit; discrimination; risk of abuse; more sedentary lifestyle.

What kind of dilemmas will this development cause?

Technology dependence; rising in society for whom can afford; technology access for whom can afford; virtual lobotomy.

Do the positive aspects outweigh the negative? Or vice versa



Positive 3; positive with boundaries 3.

Are you concerned that this kind of research/development is carried out?

Enough 2; a little 3; i don't know 1

GROUP 5

Medicine 2.1

What are the positive aspects of this development?

Not use laboratory animals; treatment of post-traumatic stress disorder; alleviate symptoms for people with mental illnesses or neural afflictions e.g. epilepsy, depression or anxiety; individual independence.

What are the negative aspects of this development?

Excessive to cure everything with medicine; boundaries of mental illness; lower the threshold of illness; development of new drugs and poisons;

What kind of dilemmas will this development cause?

Ethical; man it's not a machine; the indiscriminate use of Airborne chemical compounds.

Do the positive aspects outweigh the negative? Or vice versa

Positive have more weight.

Are you concerned that this kind of research/development is carried out?

Yes.

Artificial intelligence (computer learning) 2.2

What are the positive aspects of this development?

Build a pattern to recognize first Alzheimer signals; medical aspects are positive; more fast learning ability; reduce the number of road deaths;

What are the negative aspects of this development?

We're scared to be controlled by machines; autopilot vehicles are sure?; no empathic machines.

What kind of dilemmas will this development cause?



Humans stop to think; there will be the need of human work?; we will be able to manage machines?

Do the positive aspects outweigh the negative? Or vice versa

More positive aspects, but we need to monitoring effects.

Are you concerned that this kind of research/development is carried out?

Yes, because is a machine that could think more than an human.

Brain-computer interfaces 2.3

What are the positive aspects of this development?

Medical aspects are positive (ex. For paralyzed people, or in vegetative state, ecc...).

What are the negative aspects of this development?

A soldier that couldn't feel fear or pain: it's a new reality, not ethic; manipulation people; hacking, someone gets control over the device/brain; what are the boundaries of our physiological needs?

What kind of dilemmas will this development cause?

I give the possibility to a person in vegetative state to speak, him tell me that want to die but in Italy it's not possible: what did it solve?

Use in disabilities is good, but what about social discrimination to pay mechanic part, esoskeleton, ecc..?

Do the positive aspects outweigh the negative? Or vice versa

The actions that regard physical aspects are positive (ex. disabilities) aside for strengthening.

In the use related to mental illness the negative aspects are more dangerous.

We're scared about military purpose.

Are you concerned that this kind of research/development is carried out?

We're worried about reality simulation(in case of games); fake feedback gave from not real brain computer interfaces; what's the educational purpose?

GROUP 6

Medicine 2.1

What are the positive aspects of this development?

New treatment; diagnosis precision; disability problems resolution; medicine tested on simulation of human brain; medicine and drugs with less collateral damage.



What are the negative aspects of this development?

Development of medicine that could improve human ability; creation of human less pain sensitive and emphatic.

What kind of dilemmas will this development cause?

Too much high performance request; negative use in different society; therapeutic persecution and living will; medicine dependence; neurosciences manipulation risk from pharmaceutical factories.

Do the positive aspects outweigh the negative? Or vice versa

Are more the positive.

Are the same weight.

Are you concerned that this kind of research/development is carried out?

“Violence risk” on human being; no respect for the individual person and his limits.

Artificial intelligence (computer learning) 2.2

What are the positive aspects of this development?

Computer attack prevention; epidemic prevention; neuronal disease prevention; work automation; better quality life; important decision support; risk prevention.

What are the negative aspects of this development?

Erase the human factor; personal marketing; people categorisation; management and control of A.I.

What kind of dilemmas will this development cause?

The human replacement with robots; privacy; individual freedom and identity; A.I. control; save the emotional part.

Do the positive aspects outweigh the negative? Or vice versa

The same weight.

Are you concerned that this kind of research/development is carried out?

Yes.

Brain-computer interfaces 2.3

What are the positive aspects of this development?

Illness care; better quality life; nursing and carers; military aspect, machine remote control; civil defence

What are the negative aspects of this development?

Affordability and cost; military aspects (creation of robot/humanoid army); the safety of neural interfaces link to the internet.

What kind of dilemmas will this development cause?

Affordability; social acceptability; religious aspects.



Do the positive aspects outweigh the negative? Or vice versa

More positive.

Are you concerned that this kind of research/development is carried out?

Yes: for the public accessibility and management (it might not be within reach); a malfunction in a cheap in the brain could compromise all the human brain.

Annex 5.3 – Translated templates from round 3

Insert the translated templates and vote count

Theme/focus suggested by group 1	Policy-makers	Researchers	Stakeholders	Citizens
	System security (3 votes)	System security (3 votes)	Capital investment transparency (2 votes)	Ethic on use and abuse in neurosciences technologies (12 votes)
	Promote formation in the new “technologies” works (3 votes)	Dependence from medical treatment and brain interfaces (6 votes)	Transition of employment replaced by machines (8 votes)	Take more consciousness about new technologies potential (5 votes)
	Privacy management (5 votes)	Attention to individual identity (5 votes)	Controlled distribution by an international ethic committee (1 vote)	
	Controlled allocation (from a neutral institution of E.U.) of new medical technologies (2 votes)	Try different methods to check the results of A.I. in medical area (3 votes)		

Theme/focus suggested by group 2	Policy-makers	Researchers	Stakeholders	Citizens
	International agreement for neurosciences dual use and mutual control (9 votes)	International agreement for neurosciences dual use and mutual control (9 votes)	Ensure the project's independence (1 vote)	Necessary transparent communication on the research (7 votes)



	More information and formation to policy makers, to help choose (5 votes)	Human control maintenance over A.I. (7 votes)	Develop medicine aspects: diagnosis and treatment (2 votes)	
	Labour market evolution (4 votes)		What boundaries to increase human performance? (5 votes)	
	Individual manipulation about human brain interfaces (2 votes)	Individual manipulation about human brain interfaces (2 votes)		
	Define ethic standards for research (it's possible separate civil use from military use) (4 votes)	Define ethic standards for research (it's possible separate civil use from military use) (4 votes)		

Theme/focus suggested by group 3	Policy-makers	Researchers	Stakeholders	Citizens
	Availability and democracy of neurosciences (1 vote)	Highlight the strengths and weakness of the dual use (4 votes)	What costs and profit? (1 vote)	How gain knowledge on this themes ?
	No new weapons (4 votes)	Contain A.I. in relation to the web and to acquire dates (2 votes)	Suggest application development (5 votes)	Share critical aspects of applications
	Define the research purposes of short and medium term (1 vote)	The research have to prevent undesirable effects (4 votes)	Pay attention on applications that could generate dependence (1 vote)	More information and training to be independent from technologies (3 votes)



	Prevent information to citizens and results publicising (11 votes)	The pattern have to be 100% safe(1 vote)	Priority to the common interest (1 vote)	Find an ethical common sense and a unique agreement
	Roles for the research use: privacy, boundaries to technologies, ecc... (3 votes)	Values applications' cost and benefits developed from the research (1 vote)	A part of automation's benefits have to be invested to form humans (2 votes)	Open mind to possible risks and benefits. Imagine a society in which everyone can use well machines.
	It's make a sense to keep a person alive without his consensus?			

Theme/focus suggested by group 4	Policy-makers	Researchers	Stakeholders	Citizens
	Privacy (9 votes)		Citizens rights safeguard (2 votes)	Proactive citizen (6 votes)
	Ethic (8 votes)	Ethic (8 votes)	It's right what we're doing? What consequences? (2 votes)	
	Citizens awareness (3 votes)	What effects has the research? (4 votes)		
	Dehumanization (12votes)	Dehumanization (12 votes)	Dehumanization (12votes)	Dehumanization (12 votes)
	Define a control institution (8 votes)	Define a control institution (8 votes)	Define a control institution (8 votes)	Define a control institution (8 votes)



Theme/focus suggested by group 5	Policy-makers	Researchers	Stakeholders	Citizens
	Formation about neurosciences for policy makers (3 votes)	It's possible understand how A.I. could operate out of function for what it was set up? (2 votes)	Decrease inequalities: a fund for people with disabilities (2 votes)	More information about research results
	What role of A.I. in our society? (1 vote)	Greater control for research in A.I.	Local health administration unit donor (1 vote)	Communication campaigns to sensitise citizens (3 votes)
	International agreement and public consultation to define ethical values (8 votes)	What development in civil and military areas? (1 vote)	Direct the research using social media (4 votes)	How it's possible to find a common ethic between so many different cultures? (9 votes)
	Stop the gap from who can and who can't use new technologies (6 votes)	Independent researchers that work on A.I. (1 vote)	It's possible and right to commercialize the Human Brain patent? (2 votes)	What are the boundaries of ethic in the research?
	Rules for protect civil research from military research (2 votes)	Focus on medical purpose to cure disease and disabilities (12 votes)		Organize workshop, questionnaires, information meeting to engage citizens (3 votes)

Theme/focus suggested by group 6	Policy-makers	Researchers	Stakeholders	Citizens
How control the controller? (5 votes)	Military aspect (1 vote)	How far it's possibly develop the research? (5 votes)	Verify the pharmaceutical factory interest in relation to real medical aspects (2 votes)	More information; more consultation; more engagement (6 votes)



How will change our human relations? (10 votes)	Ethical use of scientific data (4 votes)	Control of research found and ethical/civil purposes (1 vote)	Create a international ethic committee	Be critical (1 vote)
	Regulation	Work on prevention and diagnosis (2 votes)	Homogeneous development (2 votes)	Prevent abuse (2 votes)
	Rules and politicians formed to manage the risks and responsibilities (7 votes)	Controls for A.I.	Cyber security formation (1 vote)	
	Medicine without inequity (3 votes)		Maximum transparency (1 vote)	
	Promote ethical values (4 votes)			



Annex 5.4 – Results from morning survey

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (*choose one option*)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
3	7	15	10	1

- 2) If publicly funded research have dual use potential, should it then be allowed?

- a. 30 answers
- b. 3 answers
- c. 3 answers

- 3) As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “*Brain Initiative*” or the Chinese “*China Brain Project*”

- a. 8 answers
- b. 1 answer
- c. 3 answers
- d. 14 answers
- e. 8 answers
- f. 2 answers

- 4) The European Commission has big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential?

- a. 23 answers
- b. 8 answers
- c. 5 answers



Annex 5.5 – Results from afternoon survey

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (*choose one option*)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
1	3	19	9	4

- 2) If publicly funded research have dual use potential, should it then be allowed?

- A. 30 answers
- B. 3 answers
- C. 3 answers

- 3) As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “*Brain Initiative*” or the Chinese “*China Brain Project*”?

- A. 8 answers
- B. 1 answer
- C. 2 answers
- D. 17 answers
- E. 8 answers
- F. 0 answers

- 4) The European Commission has big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential?

- a. 30 answers
- b. 2 answers
- c. 4 answers



Annex 6: Country Report - Lithuania



Human Brain Project

Citizen's view on neuroscience and dual use

LITHUANIA

Authors/Compiled by: Julija Lekavičiūtė



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Summary of results

During the discussions throughout the day there was a clear tendency that despite of the fact, that the dual use of research in neuroscience is seen as a problematic topic, whereas citizens feel left behind and see the use of the results almost impossible to avoid in the military field, the participants were of the opinion that the positive aspects and potentials related to neuroscience outweighed the potential risks and negative consequences and were more likely to support and approve research on neuroscience.

Participants were, in general, consensual and agreed almost immediately that any kind of research shouldn't be used for malicious purposes and self-seeking, though it might be hard to obtain and there is a lack of a proper legal framework. Moreover, the belief was expressed, that advances in medicine are essential as it impacts life expectancy and quality despite of all ethical questions, that still need to be answered, the possible risks or negative aspects.

One of the most central concerns were understanding the military purposes and separating potential positive and negative consequences as well as deciding whether the research results should be used or even associated with military agencies and similar researches funded by the military. Issues as the lack of information about the ongoing military actions and insufficient legal framework were described. The other frequently recurring worry has been the perception of a person and the potential change of values that might happen due to rapid technological advancement. Furthermore, the possible threats of being manipulated, acting against one's own will, or potential wars circulated throughout all the rounds of discussions, however, citizens emphasized the differences between defensive purposes and potential abuse for personal gain and when possible kept reminding one another about the substantial research contribution to the quality of everyone's lives. Some of participants expressed their concerns about possible long-term negative consequences including human evolution itself. Generally, citizens were consistently concerned about security issues even if the positive aspects of the development were highlighted previously by themselves.

It is worth noting that during the third round there were more thoughts on financial matters and affordability of new technologies, although these questions were not of key interests during the previous discussions.

Most of the dilemmas that might be caused by such development could be covered by some of these topics: ethical aspects of human and /or robot perception, potential physiological change of the human body due to new technologies or devices, fear of a significant change in social life (less job vacancies, less personal contact, people are replaced by various devices), lack of measures to ensure security.

Whether the research results had the potential for dual use by militaries or defence agencies were less important to the citizens than that research conducted was intended to improve health, social life, learning and life quality in general.



Results from Round 1 – Research and Dual Use – Overall principles

The discussion started from an activity in which all participants had to write down their thoughts and associations on neuroscience. The general opinion from the post-its of the participants is focused on the brain research, artificial intelligence, human physiology. A great share of these notes cover medicine, including both diagnostics and treatment.

In the first round of discussions, all groups stated that despite the positive effects on our everyday-lives, the dual use of neuroscientific research is a problematic topic as citizens feel left behind and see the use of the results almost impossible to avoid in the military field. Participants also mentioned the lack of information about ongoing military actions as well as the possible consequences of neuroscientific research in military. Three of the six groups discussing the first given question already expressed their wish to distinguish military purposes between defensive and destructive ones and described such difference as of great importance, identifying possible threats and harmful or malicious actions concerning their private or social lives (being highly influenced or manipulated, losing control over self, body and mind included, etc.), as well as country/state or international interests (abuse of power, chance of a war, etc.) Nevertheless, the views of all groups reflect peaceful aspirations to be one of the most essential dilemmas of possible dual use. The participants declared to be much less concerned while discussing possible use of the research results and technological development for the defence or counterterrorism directed military purposes, although all of the group conclusions indicated a certain level of suspicion relating to possible lack of control and a fine line between “good” and “bad” intentions.

More discussions were caused by the second part of this topic in the matter of collaboration with other initiatives/organisations funded by military agencies or institutions. Participants found their knowledge about the research and funding processes insufficient to decide whether or not Human Brain Project should collaborate with other projects in this certain field and if so, to what level? Can collaboration be considered to be an exchange of small amounts of specific information? Or should it provide all of the substantial data? Is it possible to limit the use of the information/data/ results provided to prevent the possible misuse for military purposes? These were the most troublesome questions addressed to the topic. Regardless of these issues, most of the groups (4 of 6) decided that collaboration in these kinds of research is necessary in order to guarantee steady scientific and technological progress. Only one group disagreed on the possibility to collaborate. Nevertheless, concerns of possible misuse should be taken into consideration as well as the need for a proper legal framework.

When it comes to the question of organisations being able to receive funding from the HBP, citizens were more concerned about potential conflict of interests and the ethical aspects of dual use of the research. Only one of the groups strongly disagreed with the idea of HBP funding an organisation if it already does a military funded research while all of the other groups were more positive, stating that technological development is essential disregarding the possible ethical dilemmas as the benefits outweigh potential



threats. It was also indicated, that there is a need for special terms, conditions or obligations (such as contracts, agreements, peace treaties, etc.) or other preventive measures under which a particular initiative or research should be conducted so that such funding would include more supervision or responsibilities for the other party.

While there were worries regarding the lack of legal framework, its problematic implementation and the ethical challenges it is clear that citizens are more likely to support the idea of research in neuroscience despite its hypothetical negative outcomes or possible use for military purposes.



Results from Round 2 – three areas of research

Medicine

As health is one of the subjects that concern everyone, the participants tended to respond in a more hopeful and optimistic way compared to the other two areas given in this second round of discussion.

When addressing the positive aspects, opinions largely coincided on the benefits of developing new medicines, diagnostic and treatment technologies. This would provide a great foundation for more effective treatment as well as it would increase life expectancy and quality. It was also noted, that development in this area could introduce a more sustainable environment (less chemical waste) including prevention of medical testing and experiments on animals.

When it comes to the negative aspects, citizens are mostly concerned about the possible developments of addictions, diseases, new forms of side effects in addition to the creation of new narcotic or toxic substances. In general, the dilemmas that might be caused strongly rely on the negative aspects noted. The participants particularly focused on influencing the perception of the world, “breaking away from reality”, as well as the possible malicious use of medicines against a person will in order to benefit from him/her.

In spite of the variety of negative aspects and possible dilemmas caused, the positive ones are considered to outweigh them, especially the development of diagnostics and the advances in treatment. However, doubts were not avoided – one of the groups noted that it is likely that negative aspects may outweigh the positive ones over time as there are still a lot of ethical questions that need to be addressed.

When asked whether participants were concerned about this research being conducted, only one group expressed their concern about development of new diseases, while other groups were positive. One of those indicated that the group had concerns before, but they’ve felt more reassured at the time, although the development in the field of genetics is still considered to be rather frightening.

Artificial intelligence (computer learning)

Discussions considering this certain topic were much more detailed in most of the groups; however, all of the groups’ final notes on citizen approaches to artificial intelligence are quite similar. Both positive and negative aspects focus mostly on the artificial intelligence impact on the labour market.

Participants were positive about artificial intelligence based robots to take over some of the daily tasks and workload in general and found it to be an opportunity for humans to have more time for creative process rather than technical work. On the other hand, participants indicated a fear of work loss and reduced number of job vacancies in general, as well as a possible lack of basic skills needed for simple tasks regarding the workload transfer to artificial intelligence based devices.

Some of the groups also mentioned other positive aspects such as possible replacement of people working under hazardous conditions so there would be fewer risks to human health. When it comes to health, one



of the groups also proposed a hypothesis, that development of artificial intelligence might significantly reduce suicide rates in the future, as a person could rely on it as to a friend or a teacher and with its analytical skills artificial intelligence could detect the potential signs of such attempts more quickly and prevent it from happening. Nonetheless, an active role of artificial intelligence could also be conditioning the loss of social skills, reduced intelligence and continuous laziness, as well as the threat of turning against humanity.

Among the main dilemmas, citizens have thought of these: human-robot relationship, loss of individuality or originality, possible unsafe environment, eco-technological issues, and of course, possibility of artificial intelligence taking over not only regular tasks, but also – control, as it could outrun us in no time and there is no clear understanding of who should be responsible for handling such a situation.

When asked about which – positive or negative – aspects outweigh one another, participants expressed two kinds of opinions. Half of the groups (3 of 6) decided that the ratio between positive and negative aspects is more or less equal, while the others noted that positive aspects are outweighing the negative ones, though the risks were also identified and included in the final answers. As for concerns, the responses match the previous question. The ‘positive’ groups expressed no concern at all, while the others mention both negative and positive feelings.

Brain-computer interfaces

The opinion on this area of research was mostly consensual; however, it should be taken into consideration that discussions mostly revolved around invasive interfaces, therefore the concerns expressed in this particular part of the project may not necessarily comment on the non-invasive ones.

All of the groups discussing brain-computer-interfaces except one foregrounded the issue of empowering people with disabilities as an opportunity to improve their quality of life by gaining greater control of the body. This also suits for the persons who have suffered from a limb loss as well as those, who have weaker senses due to physiology or a certain disease. Three of these groups also addressed to the possible use of brain-computer interfaces for self-growth, as such interfaces could be used for both learning and military exercises, experiencing traveling or even improving communication.

Regarding the negative aspects, citizens were more focused on the idea how the invasive interfaces could lead to a person acting against his/her own will, violations of privacy, possible impact on human DNA and further human development, as well as malicious or even terroristic actions.

Participants could not decide on whether development in this area is more beneficial or might cause more damage to humanity, therefore this could be considered as the central dilemma of the discussions. Half of the groups expressed their concerns about possible long-term negative consequences including human evolution itself.

Three groups decided that there is a relative balance between positive and negative aspects, while the other three noted that positive aspects are outweighing the negative ones. As for concerns, one group was extremely positive about the advancements in medicine, two groups noted this topic does not make participants feel concerned at all, while the other three groups revealed they felt somewhat concerned.



Cross-cutting

During the discussions about the development of the given areas there were a few topics that recurred from time to time. Despite one of the separate topics was medicine, comments on possible use of the newest technologies for diagnostics or medical treatment circulated during the entire second round, probably mostly because of health being the topic which, to some level, everyone is familiar with and anyone could benefit from improvements in life expectancy and / or quality.

The highlighted repetitive negative aspects are inevitably the possibilities to use any innovation as a weapon or a threat to the humankind; however, citizens emphasized the differences between defensive purposes and potential abuse for personal gain and when possible kept reminding one another about the substantial research contribution to the quality of everyone's lives.

Most of the dilemmas that might be caused by such development could be covered by some of these topics: ethical aspects of human and /or robot perception, potential physiological change of the human body due to new technologies or devices, fear of a significant change in social life (less job vacancies, less personal contact, people are replaced by various devices), lack of measures to ensure security.

Regardless of the critical sight of the areas mentioned, all of the table discussions were more likely supportive and optimistic of scientific and technological progress even though a variety of concerns were revealed.

Results from Round 3 – Questions to address in the future

Below we present the 9 most voted questions:

15 votes:

- **Will there be any legislation to ensure public safety?** (*question for policy-makers*)

14 votes:

- **Is it possible (if so –how?) to stop/neutralise a robot/AI if it becomes self-willed and malicious?** (*question for researchers; categorized under „Security“*)

12 votes:

- **Will AI be able to restrict people mental capabilities or creativity?** (*question for researchers*)
- **There are no limits for improvement; however who can say that we have reached the end? Robots?** (*question for policy-makers*)
- **What kind of documents or policies should be passed to ensure everyone’s safety and how can we ensure that new technologies would not be used against us?** (*question for policy-makers, categorized under „Security“*)

12 votes:

- **What consequences can we face and who will be responsible for them? Will there be study done to investigate if AI does not distort human nature?** (*question for researchers; categorized under „Consequences“*)
- **Is there any agency, which aims to introduce new inventions to the public?** (*question for stakeholders*)

10 votes:

- **Does (and if so – how?) the state plan to prevent from the threats related to AI? Or everything will be done *post factum*?** (*question for policy-makers; categorized under „Consequences“*)
- **Do you think that there is possibility for AI to rebel against humans?** (*question for researchers*)

In general, 48 different questions were asked, most of them – for researchers and policy makers (15 and 13 accordingly), while only 5 questions were directed at citizens and only 4 – overlapping several parties. Most of the questions inevitably are related to the legal framework regarding the dual use of research results as well as security assurance issues. However, it should be noted that only a small amount of questions aims for the lack of information or for more philosophical in-depth discussions on the topic. As six out of nine most voted questions cover such topics as safety and prevention from malicious acts or misuse of the newest technologies, as well as almost one third of all of the questions are associated with fears or possible threats already mentioned before, especially during the second round of discussions, this round however summarizes the participation in project activities very well – citizens were consistently concerned about security issues even if the positive aspects of development were highlighted previously by themselves.



Key themes present in across rounds

During the discussions across the tables there was a clear tendency that the citizens are more likely to support and approve research on neuroscience and its dual use potential despite all of the threats and possible negative outcomes discussed throughout the day.

Two topics were specifically consensual and have been agreed on almost immediately: 1) any kind of research shouldn't be used for malicious purposes and self-seeking; 2) Advances in medicine are essential despite of all the potential risks or negative aspects.

One of the most central concerns were understanding the military purposes and separating potential positive and negative consequences as well as deciding whether the research results should be used or even associated with military agencies and similar researches funded by the military. Issues as the lack of information about the ongoing military actions and insufficient legal framework were described. The other frequently recurring worry was the perception of a person and the potential change of values that might happen due to rapid technological advancement.

Demographic profile of participating citizens

Description of how well the participating citizens reflect the population in your country:

The age distribution of the participants that been involved on the day, is a bit misrepresented, because the main factor of choosing participants was their living place, not an age, that is the main reason why the main percentage of participants is on age category 18 – 34.

Data on the participating citizens:

Age:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group (general population)
18-34:	15	12	37,5%
35-44:	4	1	3,125%
45-54:	8	5	15,625%
55-64:	9	9	28,125%
65-74:	5	5	15,625%
75 - :	0	0	0%

Gender:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the gender (general population)
Men:	13	11	34,375%
Women:	28	21	65,625%
Other:	-	-	-



Education	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
Primary and lower secondary education:	-	-	-
General upper secondary education :	15	11	34,375%
Vocational Education and Training:	12	12	37,5%
Bachelor or equivalent:	8	7	21,875%
Masters or equivalent:	6	2	6,25%
Doctoral degree or higher:	-	-	-

Geographical zone (percentage of population living in...):	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
City:	14	11	34,375%
Town:	17	15	46,875%
Rural:	10	6	18,75%

Other aspects of relevance in your country?

-

Annex 6.1 – Translated templates from round 1 TABLE 1, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

Research could be used for providing emergency assistance in extreme situations, so that there would be no need for putting any other person in danger.

Do you find it problematic or reassuring? Please explain (why/why not).

It seems more problematic as there is no guarantee that the research will not be used for destructive purposes (for example, war or terrorism)

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Influence and control of a person;
- Artificial intelligence could replace people;
- Possibility of creating a humanity destroying weapon

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

Yes, it does, as it agrees with our approach on the importance of peace and defence.

Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

Yes, collaboration should be possible, but only providing "filtered" data, so that the research itself could not be used for harmful purposes.

Please explain why/why not.

For getting better and more comprehensive research results, for our safety and the continuity of life and for the medical development as well.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

No, it shouldn't be able to

Please explain why/why not.

It is difficult to ensure that the research data will not be used for military purposes. Moreover, the organization should conduct research in only one field.

TABLE 2, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

We, as citizens, think that this is unavoidable - no one will ask for our permission before using the research for the worst. Probably the most frightening thing is that military purpose could not only be directed to defence, but also to offensive actions. It's very difficult to define the fine line between the offense and self-defence. It would be best that citizens would be informed about the ongoing military actions.

Do you find it problematic or reassuring? Please explain (why/why not).

It's more frightening, than anything, because a lot of information is not known. As a small country, we could tell as for ourselves, that we would not use it for military purpose, though the same weapon in the hands of a different country could already be considered as a threat. Rumors has it that new types of soldiers are being developed, the ones you couldn't describe nor as human nor robot. And it makes us concerned that the technology might turn against us.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

Fear, that research on human brain might lead to intentions making a person lose control of its own actions. Human-robot soldiers, causing a moral dilemma - is it human or is it robot?

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

Possibly yes, but there is always that narrow niche where defence turns to offense. There are always two sides to every story, and sometimes it's not that difficult to cross that line.

Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

Project has to collaborate, as for such scientific process it is inevitable and unstoppable.

Please explain why/why not.

- Conflict of interests might but shouldn't stop the development.
- There are no guarantees that new inventions won't result in the wrong hands and be used for malevolent purposes.
- In case of successful collaboration between all the stakeholders, there is no one to conflict with.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

If the military funding is directed to ensuring security, then yes, it should be possible. Maybe the neurosciences could help to delete the worst war memories of soldiers and so help their psychological healing process. Collaboration between different researchers or organizations is necessary even if there aren't any funding issues included.

Please explain why/why not.

We believe that it's important that the country/state itself should show and develop scientific initiatives more than individual organizations as it could be considered a security ensuring step as well as the ability to identify and eliminate the possible threats.



TABLE 3, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

Research should be only used for peaceful purposes. We wouldn't like that it would be used for military purposes, though we believe that is impossible to avoid. The benefits of the various research projects are unquestionable even though the results might be used for not only citizen purposes.

Do you find it problematic or reassuring? Please explain (why/why not).

It's pretty much frightening, because the research could be used for really harmful purposes. One might want to influence one's mind. On the other hand, some of such processes are already happening in the areas of advertising or business. It is frightening to lose trust in kindness of humanity.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

We are most concerned about possibility to use the results in order to affect our mind or emotions, so that a person would become and act more like a favorable machine and not an exact human being. Moreover, we find possible use of A.I. by the intelligence or military agencies dangerous and concerning. In any case, we think it depends on the purpose the research or technological development is being conducted, created and / or used.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

Of course, we find it positive, if the use of the research is based on good intentions. Although, various institutions might affirm peaceful purposes while acting differently.

Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

We find it difficult to decide as it depends on the purpose:

1. The project shouldn't collaborate due to norms of ethics;
2. The project should collaborate to achieve more results faster

Please explain why/why not.

We find the collaboration possibly unethical, although such collaborations might make various researches more effective and in case of defensive or peacekeeping purposes would be considered especially well.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

If depends on the exact project - if it could only be used for civilian purposes, then it should be possible.

Please explain why/why not.

Even the thought that military agencies would give funding to such organizations or researches means that their results or further activities are important to military organizations. Though we consider it to be more positive if it helps making more discoveries. In any case, the purpose is the most important

TABLE 4, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

We have two kinds of questions:

1. It's seems like we're left behind and no one asks for our opinion. Military structures carry out their activities over our heads in one way or another. We feel somewhat uncomfortable for not knowing what's going on and how it will be used later. It also seems like we move on from the real, physical war to virtual one.
2. We're glad that it might push all of us forward - as a society we're going ahead with the new technologies, we are improving and so we can use it for better purposes as a part of our progress.

Do you find it problematic or reassuring? Please explain (why/why not).

There are different types of people, so, naturally, some will find it problematic or frightening, and while the others will not mind things they don't know or understand. One might feel reassured and concerned all at once, when he or she is informed better than he/she actually needs to be. Mysteries of the ones live might be at least interesting and sometimes beneficial. Though it depends on ones values, statements and

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

The fact that research results might end in the wrong hands and the use of it might become a threat is definitely concerning especially if there's a possibility of irrational use. On the other hand, we could all benefit from developments and growth in this field.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

If any actions or programmes are being used rationally, we would take a positive approach. But you never know how it might turn out.

Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

Definitely YES. Only by working together, we can reach the project goals faster and more effectively. So the potential use of the results will come to light faster too.

Please explain why/why not.

By doing so, we save our time and other resources as well we aim for the results faster.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Yes, if it is used in a wide range of applications.

Please explain why/why not.

If it could be used on different kinds of people (working in different fields), research results might point out or tilt our society the other way. For example does an agricultural specialist see the results differently or does he see it in the same way a researcher does?



TABLE 5, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

It could be used for defensive purposes.

Do you find it problematic or reassuring? Please explain (why/why not).

We find it problematic, because there is a possibility, that devices affecting the brain might be created and used for self-seeking purposes by criminals (killers, thieves, and so on)

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

We don't feel safe because in case of a war countries may be demolished

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

Yes, but just for defence or counter-terrorism purposes, nothing more.

Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

Yes, if the project still doesn't take part in any military research. Other agencies shouldn't also use the results of this very project for military purposes, unless it's defence.

Please explain why/why not.

Both parties should reach a compromise.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Yes, if that's under separate contracts.

Please explain why/why not.

If different research is conducted under separate contracts, there should be some obligations included, so that one could ensure that results won't be used for other similar projects that military agencies could benefit from.



TABLE 6, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

As they say "Even the road to hell is paved with good intentions". :)

Do you find it problematic or reassuring? Please explain (why/why not).

We find it problematic and not reassuring due to possible threat of war.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

It's hard to say, if there are any concerns, as we are not familiar with the research data that military or intelligence agencies could use.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

Yes, it does make a difference as it would be used for peace and ensuring the good or what makes us happy :)

Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

No, it should not, as the project is not allowed to take part in military research.

Please explain why/why not.

It is essential to create, not to destroy.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

If the research is "for good", it should have the possibility.

Please explain why/why not.

We wish for peace in the world :)



Annex 6.2 – Translated templates from round 2

TABLE 1, MEDICINE

What are the positive aspects of this development?

- New medications being discovered, innovative equipment and treatment technologies are being applied;
- highly qualified doctors;
- the opportunities for individualized treatment;
- the effects of medication on the human body have been better investigated.

What are the negative aspects of this development?

The negative (side/adverse) effect of medication and technical equipment on human body, eugenic danger.

What kind of dilemmas will this development cause?

Impact of equipment on the human brain, increased workload for doctors, the need for new specialties in course of the development of science.

Do the positive aspects outweigh the negative? Or vice versa?

The positive aspects outweigh the negative ones

Are you concerned that this kind of research/development is carried out?

No, this kind of research can be very useful.



TABLE 2, MEDICINE

What are the positive aspects of this development?

- Identification of possible illnesses
- Ensuring human security
- Fewer experiments on animals are conducted
- Sales of medication increase GDP growth
- Creating the medication with no side effects
- Greater human work efficiency

What are the negative aspects of this development?

- The possible development of addiction.
- New narcotic substances
- The threat of chemical weapon
- The long-term use of medication will cause side effects

What kind of dilemmas will this development cause?

- The question whether to perform the experiments on animals or humans
- The question of medication financing, i.e. whether it is worth investing in the production process.
- The long-term prospects of the use of medication will be unknown.

Do the positive aspects outweigh the negative? Or vice versa?

The positive aspects outweigh the negative; however, it is likely that this may change over time

Are you concerned that this kind of research/development is carried out?

If research is legal, science should advance.



TABLE 3, MEDICINE

What are the positive aspects of this development?

There is no need for chemical medication; the treatment with electrical impulses can be used. There are more options for accurate detection of diseases. Natural resources are conserved and the number of experiments on animals is reduced. A possibility to create more accurate medication. A prevention of diseases. The creation of one optimal medication. Applying medical research for the treatment of animals.

What are the negative aspects of this development?

- If any particular treatment is provided to everyone by force.
- Medical products that might make a malicious damage on humans, such as poisonous and narcotic substances.
- The medication might be used for bad purposes - mass destruction of humans.

What kind of dilemmas will this development cause?

- To diagnose diseases more accurately.
- To create optimal, less harmful medications.
- To help control emotions, especially the extreme ones, which, for example, arise among terrorists.
- The treatment of addictions.
- To overcome incurable diseases or identify it on time.

Do the positive aspects outweigh the negative? Or vice versa?

The positive aspects outweigh the negative ones

Are you concerned that this kind of research/development is carried out?

No, we are not.



TABLE 4, MEDICINE

What are the positive aspects of this development?

It is beneficial for diagnostic processes. Such treatment will have many positive aspects. This would provide the basis for effective treatment. It indicates great progress.

What are the negative aspects of this development?

This will not affect the treatment, because physical treatment with medical products will not affect the emotional world. The body may refuse to perform certain functions performed by the treatment or preparations.

What kind of dilemmas will this development cause?

Distribution of treatment and function of the body. The change in quality of life and health.

Do the positive aspects outweigh the negative? Or vice versa?

The positive aspects outweigh the negative ones, especially the diagnostics and the results of treatment

Are you concerned that this kind of research/development is carried out?

We are not concerned at the moment, though we had some concerns before, we don't have it anymore. The area of genetic research is worrying, it's the most uncertain and threatening.

**TABLE 5, MEDICINE**

What are the positive aspects of this development?

It is easier to identify the causes of diseases (e.g. depression) There will be no need to conduct experiments on animals. It would increase life expectancy and quality.

What are the negative aspects of this development?

Computer simulations can be used to create new drugs/narcotic substances. The technology itself might also be able to develop certain (new?) diseases.

What kind of dilemmas will this development cause?

Could and/or should the person diagnose the illness himself?

Do the positive aspects outweigh the negative? Or vice versa?

The positive aspects outweigh the negative ones

Are you concerned that this kind of research/development is carried out?

We are concerned about possible development of new unknown diseases.



TABLE 6, MEDICINE

What are the positive aspects of this development?

The improvement of human health and well-being

What are the negative aspects of this development?

The use of medication against the will of a person and his/her physiology.

What kind of dilemmas will this development cause?

Creating illusions, creating the effect of "looking through rose-coloured glasses", breaking away from reality.

Do the positive aspects outweigh the negative? Or vice versa?

50/50

Are you concerned that this kind of research/development is carried out?

We are positively concerned due to the obvious progress



Annex 2 – Translated templates from round 2

TABLE 1, ARTIFICIAL INTELLIGENCE

What are the positive aspects of this development?

Replacement of humans while working under hazardous conditions, more rapid and accurate processing of information, the use of drones for analysis of the environment

What are the negative aspects of this development?

Reducing job vacancies, the use in warfare/terrorism

What kind of dilemmas will this development cause?

Creating an unsecure environment, it may be difficult to control robots, artificial intelligence limitations, human-robot relationship

Do the positive aspects outweigh the negative? Or vice versa?

At the moment, the positive aspects outweigh the negative ones

Are you concerned that this kind of research/development is carried out?

No concerns raised, there should be a technological development.



TABLE 2, ARTIFICIAL INTELLIGENCE

What are the positive aspects of this development?

People do not risk their lives in emergency situations, such as fire.
Use for facilitating a personal life.
For industrial development
For scientific research.

What are the negative aspects of this development?

The chances are that the technology will turn against man.
A smaller number of jobs per person.
The use of equipment for malicious purposes.

What kind of dilemmas will this development cause?

The fear is that technology can turn against a man.
Whether the cost will pay off and it will be available to every ordinary citizen?

Do the positive aspects outweigh the negative? Or vice versa?

It depends on the people's knowledge of exactly how to use it.
The positive aspects outweigh the negative ones, but there is a risk that it might be harmful for a human.

Are you concerned that this kind of research/development is carried out?

No concerns have been raised so far, because we haven't encountered it.



TABLE 3, ARTIFICIAL INTELLIGENCE

What are the positive aspects of this development?

Technological development facilitates work and domestic life, you do not have to do many things manually, it allows devoting more time to other things. Through technology, it's easy for all people to perform tasks that are difficult to do on their own (for example, if a person has a physical disability, using an artificial intelligence, some work becomes easy to implement). The Internet is a very useful part of it.

What are the negative aspects of this development?

Relationship among humans becomes strained. Incoming data can be used for malicious purposes. People interact more using a computer than with other people. A person can begin to feel lazy, become dull, incapable to perform regular tasks.

What kind of dilemmas will this development cause?

To diagnose human diseases, to conduct more precise medical research. It is useful for solving various problems in trade, medicine and other fields. Contact and public relations. It's easier for a person to create, express himself. It helps solve the problems, search for information.

Do the positive aspects outweigh the negative? Or vice versa?

The positive aspects outweigh the negative ones. The most important thing is to improve.

Are you concerned that this kind of research/development is carried out?

No, we are not.



TABLE 4, ARTIFICIAL INTELLIGENCE

What are the positive aspects of this development?

The pace of work is accelerating, we are advancing. We create new things that help people. There is a decrease of the technical work that can be done by artificial intelligence. The creation of this intelligence is already a creative process that leads the society forward. If we succeed in making artificial intelligence creative, it would be a big step forward.

What are the negative aspects of this development?

It reduces human intelligence. It takes over the functions that are necessary for the development of the human mind.

What kind of dilemmas will this development cause?

An artificial intelligence can outrun us, and then we might not be able to stop the process. The question is who will handle everything? Will it make things easier or harder?

Do the positive aspects outweigh the negative? Or vice versa?

The ratio between positive and negative aspects is, more or less, equal, there are both positive and negative things.

Are you concerned that this kind of research/development is carried out?

What you don't know can't hurt you. The question is whether we will ever know what's going on and how and whether it really has progressed

**TABLE 5, ARTIFICIAL INTELLIGENCE**

What are the positive aspects of this development?

Autonomous robots can perform human work (it would reduce workload);
By establishing emotional intelligence, a robot can become a friend and / or teacher, thus, possibly reducing suicide

What are the negative aspects of this development?

Replacing human workers with robots could potentially reduce jobs;
If a robot became smarter than man, it would put humanity at risk;
IQ would be likely to decrease as all the work would be performed by robots

What kind of dilemmas will this development cause?

Will people be needed?
How to ensure eco-technological development? (so that there are no robotic dumps)

Do the positive aspects outweigh the negative? Or vice versa?

Both are equal

Are you concerned that this kind of research/development is carried out?

We are concerned about the fate of humanity



TABLE 6, ARTIFICIAL INTELLIGENCE

What are the positive aspects of this development?

Creating comfort and a quality of life for people

What are the negative aspects of this development?

Exclusion of human factor; loss of social skills.

What kind of dilemmas will this development cause?

The loss of individuality, the loss of originality and human imperfection.

Do the positive aspects outweigh the negative? Or vice versa?

For every plus there is its minus

Are you concerned that this kind of research/development is carried out?

The positive progress is good; destruction is bad.

**TABLE 1, BRAIN-COMPUTER INTERFACES**

What are the positive aspects of this development?

Empowering people with disabilities for independent activities, performing certain functions remotely, tracking and controlling people / animals, and applying to medical treatment of diseases.

What are the negative aspects of this development?

Human control, negative effects on the human body can disrupt human creative powers; Use for warfare / terrorist purposes.

What kind of dilemmas will this development cause?

Maintenance of creative potential; Health support; Excessive flow of information (its management); Whether the descendants will be affected and how.

Do the positive aspects outweigh the negative? Or vice versa?

The positive aspects outweigh the negative ones

Are you concerned that this kind of research/development is carried out?

No, we are not.

**TABLE 2, BRAIN-COMPUTER INTERFACES**

What are the positive aspects of this development?

People with disabilities can live a life to the fullest;
The application of virtual reality to military exercises

What are the negative aspects of this development?

Does the person remain a human?
Reading thoughts against the will of a man;
Chances are that the wars will be crueller;
Financial payback issue.

What kind of dilemmas will this development cause?

Will a man benefit from this, or will it cause damage to him?

Do the positive aspects outweigh the negative? Or vice versa?

The positive aspects outweigh the negative ones, since it can help many disabled people by giving them the opportunity to live their lives to the fullest.

Are you concerned that this kind of research/development is carried out?

We are concerned, because there is a bad side alongside with the good side of this area.

**TABLE 3, BRAIN-COMPUTER INTERFACES**

What are the positive aspects of this development?

Providing help for people with disabilities. To help protect against various hazards (fire, other life-threatening situations). To improve or restore human senses. To eliminate post-traumatic stress disorder. To shorten the reaction time. The computer games would provide the opportunity to travel around the world in a virtual reality.

What are the negative aspects of this development?

Dangers of obtaining information from a person without his consent, manipulating the brain, erasing (or adding false) memories, changing the person's personality, forcing a person to act against his will. A person might have difficulties distinguishing between real world and virtual world.

What kind of dilemmas will this development cause?

It would identify the problems with the brain or mind, in case of suffering from, for example, insomnia, anxiety, depression, etc. To analyse vital functions. It is useful for brain research. It is helpful to clarify the limits of human brain capabilities.

Do the positive aspects outweigh the negative? Or vice versa?

There is a relative balance between positive and negative aspects, however the positive ones slightly outweigh the negative ones

Are you concerned that this kind of research/development is carried out?

No, we are not.

**TABLE 4, BRAIN-COMPUTER INTERFACES**

What are the positive aspects of this development?

Looking forward to the future, the senses of the human beings would have improved. It would be possible to improve communication between people. This would facilitate the lives of people with disability or limb loss.

What are the negative aspects of this development?

Human thoughts change very quickly, and the computer may not keep track of these changes. In the military industry, the soldiers can be turned into violent machines. We think that it will have a negative impact on human DNA and further human development.

What kind of dilemmas will this development cause?

Will the long-term process have negative consequences? There are two sides: one can severely harm a person, and the other can help in the life process. "The road to hell is paved with good intentions"

Do the positive aspects outweigh the negative? Or vice versa?

Both sides are of equal importance.

Are you concerned that this kind of research/development is carried out?

We are concerned due to certain limitations.

**TABLE 5, BRAIN-COMPUTER INTERFACES**

What are the positive aspects of this development?

The treatment of mental illnesses, reimbursement of disability, increase of life expectancy and improvement of life quality, use of virtual reality for learning

What are the negative aspects of this development?

Invasive interfaces can be harmful for a person
It may be difficult to distinguish reality from virtual reality;
Violations of the right to privacy and, possibly, to copyright;
It is easier to manipulate people

What kind of dilemmas will this development cause?

Should we install chipsets or other invasive interfaces? How to distinguish between VR and reality?

Do the positive aspects outweigh the negative? Or vice versa?

The positive aspects outweigh the negative ones, as the contribution of the positive aspects is more substantial

Are you concerned that this kind of research/development is carried out?

We are slightly concerned.



TABLE 6, BRAIN-COMPUTER INTERFACES

What are the positive aspects of this development?

Human well-being

What are the negative aspects of this development?

We are against the negative programs installed inside the human.

What kind of dilemmas will this development cause?

The use aiming for demolition of evolution

Do the positive aspects outweigh the negative? Or vice versa?

50 % / 50 % :)

Are you concerned that this kind of research/development is carried out?

We are happy about research oriented towards medical achievements.



Annex 6.3 – Translated templates from round 3

TABLE 1

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	Will there be any legislation to ensure public safety? (15)	Will AI be able to restrict people mental capabilities or creativity? (12)	Will the results be used to create new diagnostics and treatment measures? (4)	
	What kind of restrictions will be in place for AI activities? (2)	What kind of effects does this research or invasive procedures have on human brain and body? (3)	Will there be new medicines created with fewer side effects? (5)	
		Will there be selection for the “good” genes? If so, doesn’t such selection violate human rights? (3)		



Annex 3 – Translated templates from round 3

TABLE 2

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	There are no limits for improvement; however who can say that we have reached the end? Robots? (12)	If people will start having microchips integrated in their brains, do those microchip creators will not use them to manipulate people? (7)	How often new technologies will be introduced (presented) to public? (5)	Do you think that human rights will be violated if there will be possibility to read our thoughts? (7)
	How much resources can be required for this research? (0)			
	Should there quantity limitations for AI robots? (2)	Is there a possibility and if so, when can we expect to create new limbs for people? (1)		
	Could AI be associated with politics? (2)	Will new technologies be available and affordable for ordinary users? (9)		



Annex 3 – Translated templates from round 3

TABLE 3

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Political improvement	Do you think that AI improvement in the future could help to assist and increase quality of our legal framework? (7)	When do you think AI will be able to replace 20 political parties and we will have 2 or 3 of them who will be interested in working for benefit of Country instead of themselves? (6)		
Continuation and benefits of the project		Do you think that thoughts which were expressed today will have any value? Will we be able to see final results? How will different social groups be involved in this research? (5)		
Human Rights	How can we make sure that personal information is secured when AI will be available to bigger audiences? (9)		Will there be individual selection how brain and computer interface is used? (1)	
Preparation for future technologies			What reforms will be done to prepare specialists who will be needed for mentioned research areas? (4)	What can be done by each of us to prepare for changes which will be coming in the future? (8)
Business			Is it possible that research results used in medicine could develop into new uncontrollable business? (3)	



Annex 3 – Translated templates from round 3

TABLE 4

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Consequences	Does (and if so – how?) the state plan to prevent from the threats related to AI? Or everything will be done <i>post factum</i> ? (10)	What consequences can we face and who will be responsible for them? Will there be study done to investigate if AI does not distort human nature? (11)	How could Lithuanians be affected by research results? (2)	
	How does the state plan to fix currently increasing technological and informational exclusion? (5)		How to create a program for the general public’s cultural development and use of different knowledge and achievements? (1)	5 things Lithuanians would like to know regarding this research. (6)
	What political message is being sent out to public in regards to human brain research? (1)		Why is there a lack of purposeful innovation policy in our society? (2)	
	How capable is our country to fund such scientific researches? (2)			



Annex 3 – Translated templates from round 3

TABLE 5

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Security	What kind of documents or policies should be passed to ensure everyone’s safety and how can we ensure that new technologies would not be used against us? (12)	Is it possible (if so –how?) to stop/neutralise a robot/AI if it becomes self-willed and malicious (14)		
Quality	Who should be responsible for the quality assurance of new devices? (4)			
	How should ordinary people know if all of the conducted research results are correct? (3)			
		What is the probability to program a certain AI so that it would be nothing but favourable to people and how ensure that there would be no mistakes or loopholes in the code? (5)	What measures should be taken by the stakeholders concerning scientific and innovation practices? (7)	
				Should citizens know everything regarding the use of new devices even if it is not relevant for them? (3)
		Shouldn’t the new treatment measures based on the newest technological development be created while the use of medicines with side effects be reduced in the treatment of mental / psychological disorders / diseases? (5)		



Annex 3 – Translated templates from round 3

TABLE 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	Why are you not providing enough funding for realisation and use of innovations? (4)	What kind of AI is needed to end wars between the different countries? (5)	Is there any agency, which aims to introduce new inventions to the public? (11)	Why are technological innovations being used rather reluctantly? (1)
	Why are you hiding the new discoveries from those seeking for information about it? (2)	Do you think that there is possibility for AI to rebel against humans? (10)		
	How can one impact the decision-makers' negative opinion and make it more positive? (4)			

Annex 6.4 – Results from morning survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

(mark the answers that you agree with the most with an X)

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (choose one option)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
10	7	9	4	1

- 2) If publicly funded research has dual use potential, should it then be allowed? (choose one option)

a. Yes	21
b. No	5
c. I don't know/do not wish to answer	5

- 3) As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? (choose one option)

a. Yes, the most important thing is to make progress in the research.	13
b. Yes, but only if it is based in another EU member state.	0
c. Yes, but only if it is based in an allied country of the European Union	3
d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons	7
e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.	6
f. I don't know/do not wish to answer	2

- 4) The European Commission has a big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? (choose one option)

a. Yes	18
b. No	8
c. I don't know/do not wish to answer	5



Annex 6.5 – Results from afternoon survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? *(choose one option)*

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
7	7	8	7	2

- 2) If publicly funded research has dual use potential, should it then be allowed? *(choose one option)*

21
8
2

- a. Yes
- b. No
- c. I don't know/do not wish to answer

- 3) As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? *(choose one option)*

17
2
3
7

- a. Yes, the most important thing is to make progress in the research.
- b. Yes, but only if it is based in another EU member state.
- c. Yes, but only if it is based in an allied country of the European Union
- d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons
- e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.
- f. I don't know/do not wish to answer

2

0

- 5) The European Commission has a big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? *(choose one option)*

23
7
1

- a. Yes
- b. No
- c. I don't know/do not wish to answer



Annex 7: Country Report - Malta



Human Brain Project

Citizens' view on neuroscience and dual use

Malta

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Summary of results

It is relevant to indicate that since most of the participants were not very knowledgeable and, at the same time, still held strong convictions on the subject, most of what the participants communicated reveals more about their uncertainty rather than being an implication against progress and developments in technology.

The participants had many positive considerations towards neuroscience, some of which included the possibility of enhancing lifestyles and improvements in living conditions, precise and quicker diagnoses, and as a consequence, better capacity for more exact, adequate and powerful treatment of diverse conditions and diseases. Importance and value were given to the positive and humane outcomes and ramifications of the research. Participants were not very concerned, generally speaking, about resisting the potential for dual use of research although the emphasis often was on avoiding abuse of the results of research rather than on dual use. Nonetheless, they stood firm to the belief that EU funding is directed towards always seeking to holistically benefit civil society and not just the selected few, or even worse, only the wealthy, the privileged or those in the higher classes of society. Moreover, many participants questioned the concept of ethics and the possibility of humanity losing control on what itself created. The discussions at times focussed on the importance of critical educated citizens with good ethical principles and who value human life.

In every round and across all six tables, the participants affirmed the need to have rules, guidelines and frameworks for research and also its usage and discharge with ethical ground rules designating what can be done, what is to be avoided and also what is to be completely renounced. The dilemmas that were frequently indicated included: whether we are capable of keeping up with the fast moving progresses; whether we will still be capable of having control on our emotions; whether the enhanced way of living will be available for everybody, irrespective of age, sex, race and financial status. Furthermore, it seems like after the workshop, some of the participants remained rather sceptical and are still less likely to agree with the idea of collaboration with organisations working for or receiving funding from defence agencies.

The overall conclusion for the workshop was that the participants were in most cases positive about the advantages and importance of neuroscience. Albeit, there was very little awareness and knowledge on its potential for dual use. The majority of participants considered and concluded that the positive aspects and potential attributed to neuroscience surpasses the potential risks and negative consequences. Concurrently, participants declared that they had little capacity and power over the developments that are taking place and the research that is being conducted. In their perspective, what matters most is that the citizens are never alienated and nonetheless mislead.



Results from Round 1 – Research and Dual Use - Overall principles

At the beginning of the workshop, participants were asked to write on post-it's the main ideas that come to their mind when they hear the word "neuroscience". Many of the participants gave what many may refer to as the dictionary definition of the term, describing it as a field of study which delves into "the functions and states of the different parts of the brain". A large number of respondents had a really clear understanding of the concept and they managed to present a comprehensive interpretation of the term, some of who described it as "the study of how the brain is wired and how it functions, whether neurons are fired up in the left or right side of the brain and how it makes the person act and behave". There were also a few participants who got perplexed by the concept and answered that they knew nothing about it. On the other hand, there was a good portion of the participants that gave their insight and belief on the subject, some of who described it as "very interesting... its potential is limitless and it should be given more importance", another comment was that if the subject had to be given more status it can render "a better understanding of tomorrow".

In the first round of group discussions, the groups were asked to discuss together their concerns in the scenario where publicly funded research could have dual usage, that being; civilian application and military applications. None of the groups really agreed on one reaction to this question. The answers were different and often reflected what each participant valued in life. Discussions diverged from stating that such dual use is "inevitable", some participants expressed their worries with regards to the effect of dual use on vulnerable people and also on animals. Something which was common amongst all groups was the importance that they gave to awareness and how vital it is to make people receptive of what is happening through education. The participants also expressed that this is quite paradoxical and that although they have merely no choice/say on what and how research is conducted, they insisted that the collected data is to be made public.

When asked whether in their opinion such research and dual use was to be considered either problematic or reassuring, the perceptions were mixed, albeit, the overall conviction was that the benefits that may be reaped will outweigh the risks. Those who suggested that the situation is problematic insisted that control is critical, others believed that "there is already enough military research" and that even if it is for defence, "people will suffer". Another portion of the participants suggested that although they accept such dual use, they do so with reservations as if it had "to fall in the wrong hands it will be catastrophic". An interesting comment was that such judgment is of a subjective nature and that awareness and education is of paramount importance. Notwithstanding the fact that many individuals had reservations, this does not imply that the groups were against the advancing research on neuroscience and its potential for dual usage. A recurring statement emphasized that the highest degree of reassurance is attained when the respective research being carried out is being done with the main intention of improving the quality of life, especially in the medical field. On the other hand, when it comes to its military use, the persisting remarks were that such use may be "alarming". Thus, while a good number of participants expressed uneasiness towards the prospects of neuroscience results being abused for military purposes, most of them also asserted that such outcome is inevitable. The honest application of dual use was mostly linked to practices which contributed



to the wellbeing of the civil society that saved lives, and also ones which aided soldiers in dealing with war traumas.

The third question in Round 1 dealt with the possible concerns that participants might have with regards to the possible use of the research results by the military and intelligence agencies. It was generally considered that as long as the results are not used to dehumanise people, either biologically or simply by impeding on their freedom, they should be supported. Intelligence agencies are perceived by many of the participants as forces that protect the societies and that give them equanimity. A certain concern was about politics and their power on warfare, some groups showed their uneasiness towards the potentiality of abuses in political applications and their ability to produce destruction. Question 4 expanded on the concept of usage by military and intelligence agencies through the extent that they might be used for either defence or counter-terrorism and challenged the participants to analyse the difference between the two usages. The concept of dealing with counter-terrorism was applauded by all, however, defence was not understood by most of the participants. Moreover, defence was in most cases apprehended negatively and it was specified that “the ends must not justify the means”. The portion of participants that expressed that such dual use and by whom does not create any differences, still made it a point that the value of human life is to be preserved in all aspects.

When it comes to the question of whether the Human Brain Project is to assist and collaborate with research initiatives and organisations that work for or receive funding from defence agencies, the groups widely agreed that the HBP should engage in such cooperation. A common justification was that sharing knowledge is always good and that limiting research would not solve any problems and also would not keep away any threats. Participants also mentioned that since research is by its very nature very time consuming and very costly to conduct, collaboration and teamwork will nonetheless ease the process and enhance the result. Again, for this question, the groups emphasized the importance of educating the people and that authorities should refrain from alienating the people who are mostly to be affected by the outcomes. Some groups also expressed their uncertainty regarding openness of research. They, however, asserted that in the scenario where restrictions are in place and all is monitored nothing will be improper as abusers will be easily uncovered. Furthermore, when asked whether it is acceptable for them for an organisation to receive funding through the HBP for their civilian research, if they at the same time are conducting military funded research, the reactions were mixed and the subsequent reasons had a great deal of similarity across tables. The main opinion on this was that there is nothing wrong in funding a research that is done ethically. Moreover, the overriding idea was that funding should be given based on accountability and that parameters should be set. The respective history and track record of the organisation is also to be taken into consideration.

Without any shadow of doubt, the topics of the questions for Round 1 overlapped and it is safe to say that there was a great deal of similarity across the six tables. A broad percentage of the participants showed their concern in relation to the importance of holistic education and the cultivation of awareness amongst the people, regardless of whether the respective research is to be used for military or civilian purposes. This sequentially led to the second most important point which concerned most of the participants, that is the safeguarding and respecting of the human being.



Ultimately, neither the research nor its potential of dual usage was deemed as worrisome to the participants. There was a unanimous agreement that if such is done ethically and without dehumanising the individual, it has the potential to effect people positively in several ways such as enhancing their lifestyles, save their lives and also broaden their capabilities. The issue which worried many was that of the abuse by those in power who have the potential to create a catastrophe if only they choose to use such research as a means to manipulate the people. Having said that, the participants were enthusiastic of the continuation of research in this area as they understood that the positive results, will hopefully counterbalance the negative risks that such research may bring about. It was considered imperative amongst the participants that the main aim of all will be to help the civil society and all its citizens, to have better living conditions, a safer environment and also that the same citizens are kept informed and educated in a way which does not create any doubt or alarm.



Results from Round 2 – three areas of research

Medicine

According to the four groups that discussed the potential developments in medicine induced by neuroscience, the indicated positive aspects were principally the ability to develop more accurate diagnosis and that of mankind giving/having more knowledge about mankind. A wide degree of importance was also given to the fact that when such development is spread there will be less expenses related to the treatment of such illnesses. Amongst all participants was a recognition that enhancement of this field will support and promote a better quality of life and let up on health related hardships.

When it comes to the negative aspects of medical applications, the main focus was on the misuse of dual use. Participants expressed their doubts in the scenario where research is abused for the manipulation and for the controlling of the crowd. There was a general uncertainty on the side effects as since most of the advancements and treatments are quite recent, the situation makes it uneasy to detect negative aftereffects. Two particular participants were concerned that many people are not questioning what is being given to them and that as long as people heal, they are happy to act as experimental subjects, referred to as “guinea pigs”.

Since this subject affects directly almost everyone, dilemmas were numerous and participants all shared their preoccupations which included the fact that while such advancements are solving many problems, they are at the same time creating new ones. The participants focused also on preferences, they established mixed feelings on who will benefit the most and who will be left behind. Having said that, the main argument was whether such advancement will only serve the wealthy few and disregard those who cannot pay.

When asked whether the positive aspects of such advancement in medicine outweighed the negative, most of the participants were positive that the beneficial outcomes are greater. However, there were still a certain few that expressed their belief that there will be more negative impacts when compared to the positive ones.

The last question dealt with whether the participants are concerned about this research being conducted, three groups were fully concerned, while one emphasised that they were sceptical about the situation. Another group specified that what they referred to as “the testing phase” was a concern and that “negative issues exist anyhow”, therefore, it is better to extract and seize the good.

**Artificial intelligence (computer learning)**

Artificial intelligence was talked about and explored by four groups. The substance of each discussion on the different tables was quite similar. When it comes to the positive aspects of such development, it was quite held in common that artificial intelligence is helping humans enter waters where they were usually physically restricted to do so. Another common view was that computer intelligent systems abolish human error. An interesting discussion delved into the ability that such artificial intelligence gives the human to make more objective judgements which will lead to more impartial and far-reaching results. Other positive aspects incorporated the benefit of easier access to information, a bigger opportunity for more comprehensive possibilities and also that of improving living conditions through the offloading of jobs that are tedious and boring.

When it comes to the negative aspects of artificial intelligence, the most recurrent theme was “laziness” and that people will be willing to give up on their sovereignty for comfort. Another regard was that of the loss of jobs and the possible crisis of robots taking the roles of humans. Participants asked questions such as “what will happen with the human life?” and “will life still be rewarding?”, such disillusion brought about again the problem of the fear of dehumanisation and potential impaired ethical judgments.

The predominant dilemma amongst the tables was that of the funding of such development and the intention of those who are investing in it. Another prevailing dilemma was whether humans are aware on where to stop and the capacity for moral judgements in all of this.

The last question posed to the participants in the sphere of artificial intelligence dealt with the concern that they held in relation to the kind of research/ development that is being carried out. Participants generally suggested that such an answer is subjective and that if the research and ultimate developments are used for good causes, there was nothing problematic. On the other hand, if such development is abused, many are concerned that in reality we have little power and are as a matter of fact helpless in changing the outcomes.



Brain-computer interfaces

Amongst all the four groups that delved into and discussed brain-computer-interfaces was a certain common ground which emphasised the beneficial role that such progress delivers. Improvements in the ways and methods of educating people were valued by many participants. Moreover, many expressed their positive attitude towards its medical use and how it boosts the effect and precision of treatments. When it comes to military usage, many shared the point of view that there will be more accurate attacks where less civilians will die. An interesting perspective went around the alleviation that such development is giving to amputees, where they are seen becoming more independent.

The discussed negative aspect revolved around the military and how it is using technology that is invasive and destructive. Many were also concerned about the prospect of being watched and expressed their worries that what we actually read in dystopian novels might become a reality where there will always be a “big brother watching”. One of the tables agreed that “we are going at a momentum” and that a time will come when if we are not in control of the situation it will only be a case of “survival of the fittest”.

Dilemmas were again aplenty as many participants questioned the fast pace that science is moving in, and at the same time the lack of education and awareness amongst the people who are being directly affected. The issue of how this progress and its ramifications will be shared was also debated, many are preoccupied that the advancements will only be accessible to the rich and most privileged.

On the question as to whether the positive aspects outweigh the negative ones, most of the participants agreed that “for now” the positive counterbalances the negative. When it comes to the concern of the participants with regards to the implementation of such research and development, most of the participants expressed their support and trust in the implementation of such. Nonetheless, there were others who expressed their willingness to get a better picture of why it is being conducted and ones who further asserted that “knowledge is power, even if negative, we can do something about it”.

**Cross-cutting**

Many topics of the questions overlapped and there was a great deal of similarity across the six tables. In terms of the positive aspects, the improvements in diagnoses related to illnesses was one of the emerging and highly valued positive outcome of developments. It was reasoned that earlier identification of problems related to health would contribute to a better and more precise medical treatment.

A negative aspect which was brought up and discussed by all groups was the dehumanising tendencies that such development is capable of rendering. Almost all of the participants were concerned about invasion and how such advancements have the potential to impede on individual privacy. Furthermore, the aspects of control, awareness and education were all considered to be vital for there to be a smooth and profitable outcome from all development.

The dilemmas that were frequently indicated included: whether we are capable of keeping up with the fast moving progresses; whether we will still be capable of having control on our emotions; whether the enhanced way of living will be available for everybody or only for the rich and the privileged, irrespective of age, sex, race and financial status. Last but not least, many participants questioned the degree to which ethics are being taken into consideration and also the importance of ethics to be encompassed in everything that is determined.

In all the three example areas, the participants appeared to be quite supportive of research but at the same time continuously called attention to the importance of control and respect of humanity.



Results from Round 3 – Questions to address in the future

Top 10 questions:

Number 1 (22 votes):

- *Will the European Communities be willing to fund such research, if such research had to be of a non-profit nature but only aimed at educating and empowering the citizens?* (Question for policy-maker's researchers and stakeholders, categorised under holistic education/ ethics)

Number 2 (21 votes):

- *How can the results that come out of a study be safeguarded for good use?* (Question for policy-makers and researchers, categorised under politics)

Number 3 (21 votes):

- *Can you ensure that findings for this project come from an ethical source which has no negative bias?* (Question for researchers and stakeholders)

Number 4 (21 votes):

- *What checks are in place or will be put in to place to counter systems with malicious intentions?* (question for policy makers, categorised under policy)

Number 5 (21 votes):

- *How are you going to ensure that the research does not get off track? I.e. take another direction than the one 'commissioned'* (Question for policy-makers)

Number 6 (19 votes):

- *Who/what regulated/controls/includes/excludes the following: usage; intention; results; products algorithms; methods; dosages?* (Question for policy-makers and stakeholders, categorised under medical-cure)



Number 7 (15 votes):

- *How can we ensure that the advances in neuroscience are accompanied by investment and advances in education and ethical studies?* (Question for policy-makers)

Number 8 (15 votes):

- *Can there be more research to cure disease, to facilitate peoples' life and less research to mass destruct the population?* (Question for policy-makers)

Number 9 (14 votes):

- *Who gets to choose what population gets chosen for a particular type of trial?* (Question for researchers, categorised under medicine)

Number 10 (14 votes):

- *How can researchers guarantee that our civil rights are safe-guarded?* (Question for researchers, categorised under Politics)

Most questions were directed at policy makers and researchers, with 28 and 21 questions directed at each respectively, which is far more than citizens and stakeholders with 10 and 15 questions, respectively.

As to the content of the most voted for questions, there was also a clear tendency, which follows some of the themes from the previous rounds. Of the 10 questions, half revolved around the transparency and the avoidance of bias of the respective research, the criteria, rules, ethics and morals and to what extent is the protection of each citizen being taken into consideration. Two questions addressed the checks that are conducted in order to protect such results from being seized by the wrong hands and also asked for more information regarding who will be making economic gains in such scenarios. Another interesting question concerned the reliability of sources and inquired further clarifications on how bias is kept afar.



Key themes across rounds

The principal subject matter that reappeared across most of rounds on every table was that although participants are very much endorsing research in the field of neuroscience, at the same time they are still very much advocating the importance of setting up core foundations, ethics, rules, criteria and guidelines in order for the dual use of the resulting research to be valuable and constructive.

The positive attributes and potential related to the handling of dual use research in neuroscience mainly revolved around the improvement of lifestyles, altered living conditions and a better rounded method of diagnoses. When compared to the two other subjects, medicine and its relation to health was very much debated, especially in areas of mental disorders, amputations and problems with eyesight. In most cases, the most valued requisite was that the research conducted by the HBP and other publicly funded research initiatives are to contribute to the mass of the civil society and not just the very few who are privileged and who can pay for the service or treatment, therefore, eliminating discrimination in the allocation of advancements.

The participants were less worried about the potential positive use of dual use of such research, and more preoccupied by the abuse of such. The most acclaimed concerns were related to the degree of control that citizens have over the numerous patterns and behaviours of manipulation. It was agreed on all of the tables that whatever advancements are developed, those in power and the people themselves should always respect the nature of humanity and its appeal for liberty and privacy.



Questionnaires

Start of the day questionnaire

At the beginning of the workshop, the participants were asked to fill in a questionnaire that consisted of four questions. The first question addressed the extent to which participants feel concerned about the potentiality of the HBP research being used by others for political, security, intelligence or military purposes, on a scale from 1-5. "Not at all concerned" to "Extremely concerned". Five out of thirty-two participants answered that they were slightly concerned, and six answered that they were moderately concerned. Seven listed that were extremely concerned, while another seven were not concerned at all. The second question dealt with whether publicly funded research that has dual use potential, should still be allowed. Out of 32 participants, 28 answered positively and only one participant answered negatively with a "no". Furthermore, three participants answered that they did not know / wish to answer. The third question asked whether the HBP should cooperate with other research initiatives or organisations that receive funding from or work for defence agencies. Four participants answered with a "no", while eight answered "yes, but only initiatives or organisations in countries that have signed and ratified international treaties on e.g. chemical or biological weapons". Only one participant answered "Yes, the most important thing is to make progress in the research". Fourteen participants answered that they "do not know/ do not wish to answer". The last question asked whether the European Commission's focus and commitment to open science should also be maintained with research that has the potential for dual use. Twenty-three participants answered positively with a yes, while three answered negatively with a "no", six participants answered that they did not know or wish to give an answer. These results may reveal that previous to workshop, many of the participants were mostly unsure/unaware of the dual use potential of research.



End of the day questionnaire

At the end of the workshop, the participants were again asked to fill in the same questionnaire that they filled in the morning. This was done in order to identify whether the workshop had in anyway affected their opinion and outlook.

The first question addressed the extent to which participants feel concerned about the potentiality of the HBP research being used by others for political, security, intelligence or military purposes, on a scale from 1-5. "Not at all concerned" to "Extremely concerned". Five out of the thirty-two participants answered that they were slightly concerned, and seven answered that they were moderately concerned. Seven listed that were extremely concerned, while four were not concerned at all. This suggests that participants became less concerned after the workshop.

The second question dealt with whether publicly funded research that has dual use potential, should still be allowed. Out of 32 participants, nineteen participants answered positively and only one participant answered negatively with a "no". Furthermore, twelve participants answered that they did not know / wish to answer. Nineteen said yes, as opposed to twenty-eight in the morning, this may convey that after the workshop some participants might have become more sceptical on the dual use of research.

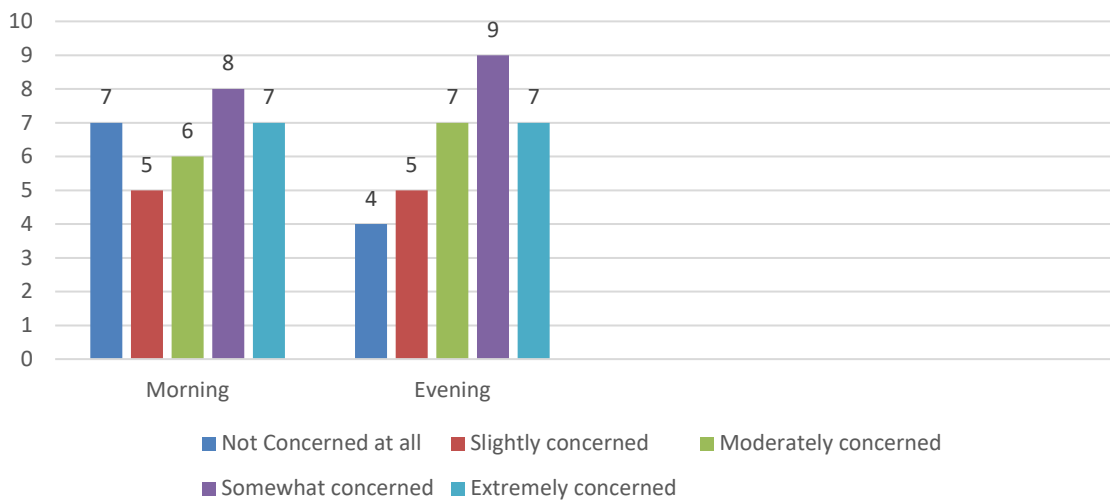
The third question asked whether the HBP should cooperate with other research initiatives or organisations that receive funding from or work for defence agencies. Five participants answered with a "no", while twelve answered "yes, but only initiatives or organisations in countries that have signed and ratified international treaties on e.g. chemical or biological weapons". Eight participant answered "Yes, the most important thing is to make progress in the research". Seven participants answered that they "do not know/ do not wish to answer".

As for the last question, participants were asked whether the European Commission's focus and commitment to open science should also be maintained with research that has the potential for dual use. Twenty participants answered positively with a "yes", while six answered negatively with a "no", six participants answered that they did not know or wish to give an answer. Positive answers to this question decreased by the end of the workshop while negative answers ("no"), increased.

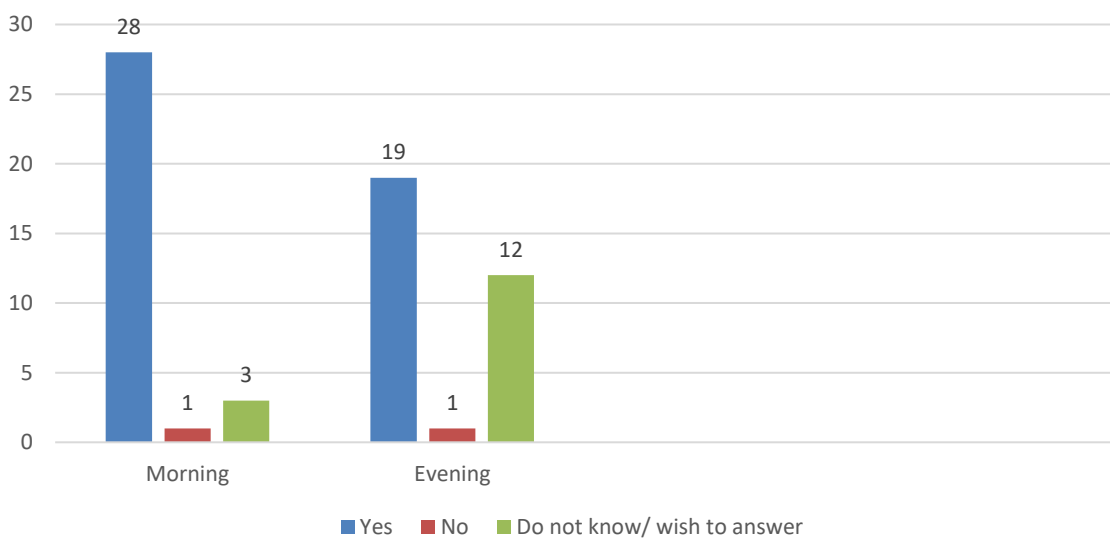
It seems like for some of the participants, the more they learnt and discussed about the dual use of research and its potential, the more concerned and less likely they become to comply with organisations and initiatives working for or receiving funding from defence agencies.



Question 1: Does it make you concerned that the research from the HBP could be used by others for political, security, intelligence and military purposes?

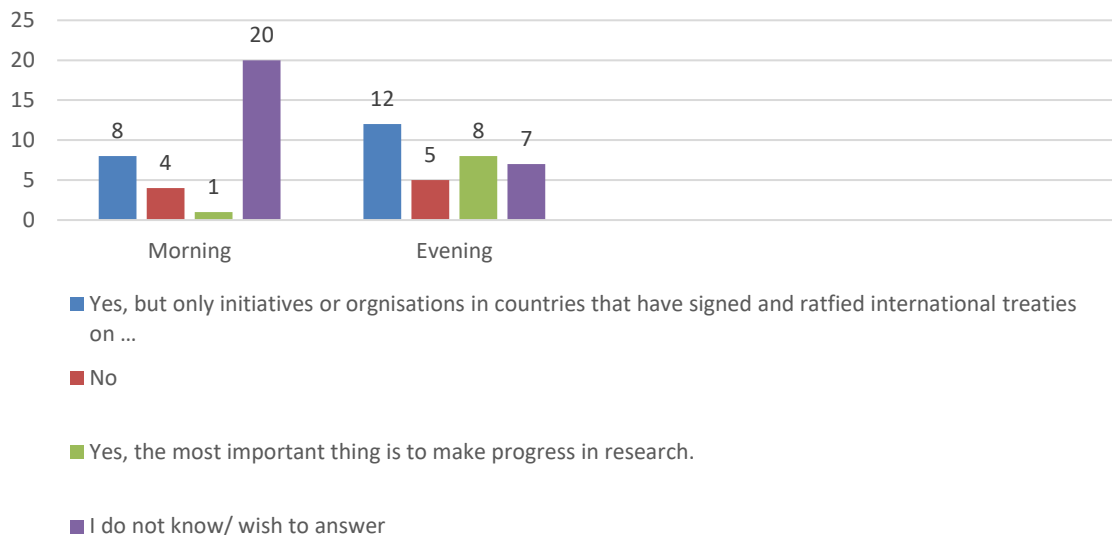


Question 2: If publicly funded research have dual use potential, should it then be allowed?

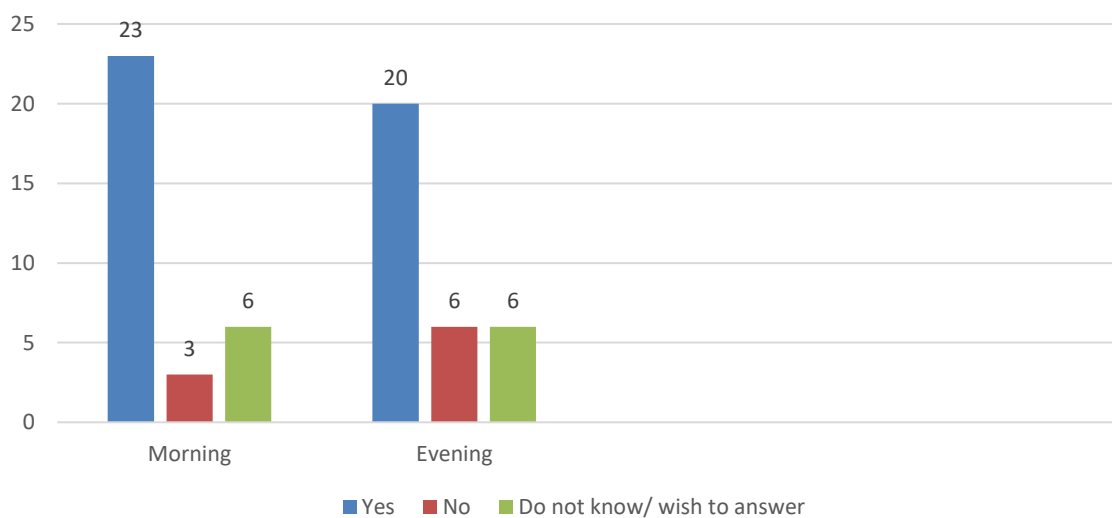




Question 3 : As a European funded project we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain initiatives or organisations th



Question 4: The European Commission has big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential ?



Demographic profile of participating citizens

Description of how well the participating citizens reflect the population in your country:

The age distribution of the participants that participated on the day, is rather well dispersed. The same goes for the representation of men and women.

The results are very much close to the Maltese demographics except for those in the area of education. Only four citizens amongst those who signed up for the workshop had primary and lower secondary education. On the other end of the scale, there was an overrepresentation of people with master's degrees or equivalent and doctoral degree, that is 20 participants.

Data on the participating citizens:

Age:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group (general population)
18-29:	8	6	19% (18%)
30-39:	8	5	15.5% (19%)
40-49:	7	6	19% (16%)
50-59:	7	5	15.5% (16%)
60-69:	6	5	15.5% (16%)
70+ :	6	5	15.5% (16%)

Gender:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the gender (general population)
Men:	19	17	53% (50%)
Women:	23	15	47% (50%)



Education	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
General upper secondary education :	5	4	13% (56%)
Bachelor or equivalent:	10	8	25% (27%)
Tertiary education :	26	20	62% (17%)

Geographical zone (percentage of population living in...):	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
Town:	22	17	47% (48%)
Rural:	20	15	53% (52%)

Other aspects of relevance in your country?

People with lower education levels might have been scared about the subject matter.



TABLE 1, Template 1

Annex 7.1 – Translated templates from round 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- “Although it was not our choice, it is a good thing that the data is public and not hidden from us”.
- Compared to a paradox.
- “The pursuit of knowledge is free to all people. While this can result in unintended uses, it is more fruitful to be aware of and hold accountable, such unintended adaptations, than to stifle the sharing of knowledge”.
- “It depends, sometimes it can be beneficial”.
- “I agree that research should always be open because it my belief that different researchers bring different perspectives to research which moves research forward”.

Do you find it problematic or reassuring? Please explain (why/why not).

Problematic:

- Needs to be controlled.
- Progress would turn into problems.
- “What if it is used badly?”.
- “History has shown that it is often used for harm”.

Reassuring:

- “We trust in the EU, that it will control its use”.
- Research is neutral.



What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- The effect on innocent civilians, whether in war or in everyday life.
- “If it is used for the advancement and unity of nations, then it is good”.
- Manipulation of control of civilian populations.
- Stifling the freedom of expression.
- Concerned about the purpose of research.
- Governments and military have large funds.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- It makes a big difference as long as it is used for counter-terrorism.
- One needs to ensure that those labelled as terrorists are actually terrorists.
- “Terrorism is funded; we never have a say with higher intelligence”.
- “As long as the value of human life is preserved in all directions...”
- “No exceptions should be made!”.
- We will end up losing our identity.



TABLE 1, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- Group was split but leaned more towards “yes”.

Please explain why/why not.

- “Larger collaboration”.
- “Bigger pooling of funds”.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- Group was split and did not lean towards any direction.

Please explain why/why not.

- As long as the data is public, the group agreed that it should be allowed”.

**TABLE 2, Template 1**

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- “The reputation of the potential collaboration partner should be taken into consideration with the real prospect of withholding research likely to be used against civilian purposes”.
- “Collaboration helps us know more, have more say and can set rules”.
- “Open collaboration is difficult”
- Essentially, there is nothing wrong with this dual use, but it must be controlled/regulated/monitored and supervised.
- Although it has happened so far and it seems an inevitability, it is extremely dangerous and can jeopardize human existence.

Do you find it problematic or reassuring? Please explain (why/why not).

It is a problematic situation: (x4)

- It will turn bad for sure.
- Needs to be controlled.
- “Progress will turn into regress”.
- “People will always suffer!”

Reassuring: (x2)

- “Authorities know what they are doing!”



What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Military secrecy is a problem.
- “Funding sources and bias”.
- “The truth!”.
- “Nothing!”.
- “I lean more towards the positive aspects of such”.
- “harming civilians”.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- “No exceptions should be made”.
- “The can still be misuse!”
- “If it is used for counter-terrorism it is acceptable but if it is used as a defence by a country/ individual it is terrifying!”
- “Yes!”
- “Yes it should be used with caution.”
- “The end should never justify the means”.



TABLE 2, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- “They can but they should not!”
- “Agree”
- “Depends on what they are doing- if for protection of humans then no”.
- No they should not as it’s like the HBP itself is doing military research!”
- “Indirectly this would mean that the HBP results would end up in military”.
- “As long as it is monitored collaboration, and if this is used for defence + security”.
- It might still be risky.
- “Clear consensus is needed and also knowing what the enemy is doing is vital!”.

□

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Yes (x 3)

No (x1)

Please explain why/why not.

- “It is right to fund as long as research is done right”.
- “Funding should be given based on accountability”.
- “It is a good way to know what is happening but there should still be limits”.
- “Due diligence needs to be done”,
- one participant will not allow it because they do not trust as from his point-of-view there are always bad intentions.

**TABLE 3, Template 1**

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- “Collaboration helps us know more, have more say and can set rules”.
- “It is important that the outcomes of the research are utilised by everyone”.
- “This is inevitable”.
- “Worried about the vulnerable people”.
- “Research should not be against animals”.

Do you find it problematic or reassuring? Please explain (why/why not).

- “OK if used by everyone”.
- “Slightly worried if research is used in a bad way”.
- “Worried!”.
- Reassuring the areas of counter-terrorism.
- “Slightly worried, if used to harm people”.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- “They may invent something that limits humans from using same research”.
- “I am positive that the use of medicine can help reduce people’s capabilities”.
- “When it comes to intelligence agencies, I am not worried as they are trying to catch criminals”.
- “Criminals could get stronger everyday”.
- “This can help catching drug lords”.



Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

Counterterrorism is defence – we must think about:

- Individual and social awareness and consciousness
- Ethics and emotional aspects

**TABLE 3, Template 2**

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- Yes (x4)
- No (x2)

Please explain why/why not.

- “This will lead to improvements”.
- “They should not!”
- “As long as the intentions are completely positive”.
- “It will be abused!”



Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- Yes (x4)
- No (x2)

Please explain why/why not.

- "As long as it is based on ethical judgements, it is fine".



TABLE 4, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- The use for military and/or intelligence purposes has been going on for a long time, but civil society is unaware of the impact. The risks should be debated.
- I do not think that military use is wrong, but power cannot be centred in a single group.
- I have doubts that public opinion can influence the process.
- It is difficult for civil society to change things because of the power of institutions, but we can change the opinion of researchers working in these areas; and we can influence laws. There is power in citizens and civil society/research/ethics institutions.
- “A way of life...”

Do you find it problematic or reassuring? Please explain (why/why not).

Problematic:

- Warfare abuse.
- “Problematic if used for negative purposes!”.
- “They take advantage to gain power, money and destroy humanity”.

Reassuring:

- “It makes a difference to more peace of mind”.
- That good judgement and dialogue arise between civilian and military institutions.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- “As long as it helps humanity, I have no concerns”.
- “The motive”.
- “Bias”.
- “Abusing of vulnerable people”
- “We have little control”.



Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- It's the same, because it depends on the ethical/good and evil concepts in different cultures;
- The best defence could be the attack.



TABLE 4, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- Yes (x5)
- No (x1)

Please explain why/why not.

- “I think that information can always lead to improvements”.
- “Morally, they should not!”
- “Information is accessible, might as well use it”.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- Yes (x4)
- No (x2)

Please explain why/why not.

- “Is the military research for good or for bad intentions?”.
- “Rather err on the side of caution”.
- “It is always imperative to exert limitations”.

**TABLE 5, Template 1**

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- “I do not understand wars”.
- Education and awareness is vital.
- “I think that information is to be shared as it can lead to the improvement in the treatment of different conditions”.
- “Since there can be dual use, once the results are used for the good of humanity, I agree that it should be used!”.
- Interpretation of research is vital.

Do you find it problematic or reassuring? Please explain (why/why not).

Problematic (x 5):

- Most of the participants on table agreed upon the fact that it can be used against what is considered right.

Reassuring (x1):

- “I accept it with reservations”



What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- “What are the limits?”.
- “My concern is on all levels”.
- “Will it really serve the common good?”.
- “I am totally against robots; humans should step up their game to always be in the lead”.
- The good interpretation of results is very important.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- It makes a difference, but it depends on the ethical limits that may be overrode:
 - How far do we go to prevent an attack?
- “It depends on the information is used”.



TABLE 5, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- Yes (x5)

Please explain why/why not.

- “As long as it improved research related to health”.
- “Importance of funds – so sometimes have to collaborate”.
- “Research is always an act of improvement”.
- “Limiting research will not solve anything... defence will get around to do it anyway”.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- Yes (x5)

Please explain why/why not.

- “Kills two birds with one stone”.
- “As long as you do not share data between clients”.
- “Possibility that some other agencies/ individuals may be doing the research anyway”
- “Better to monitor them”.



TABLE 6, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- If open it is positive.
- Parameters on the usage of the results should be applied.
- “Defence use is not all negative”.
- “All open research is beneficial!”
- “This is always the same with science, the way in which we use it is the most important!”

Do you find it problematic or reassuring? Please explain (why/why not).

- “Money power might be problematic”
- “Stopping it is not a solution!”.
- “It must be controlled”.
- “Ethics should be thought from a young age”.
- “Are bodies strong enough to control and stand up against something bad... are we prepared to it?”

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- “the purpose of research”.
- “they can start using research on soldiers”.
- “the motive of who is using it”
- “outcomes can be used to help on hindering progress for personal gain”.
- “eradication of people”.

counter-terrorism purposes?

- It makes a difference because the concept of “defence” in the EU is different from the one in Asia, Middle East, etc.
- It makes a difference if we lost our natural resources – catastrophic situation (our defence might be different depending on the available conditions).



TABLE 6, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Yes (everyone agrees).

- “We need access to their research as well!”
- “There is a guarantee that they will use the research correctly!”

□

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- All participants were positive about this as long as “the collaboration is monitored and people are safeguarded”.

Please explain why/why not.

- Whether we like it or not it should be used.



TABLE 1, Medicine

Annex 7.2 – Translated templates from round 2

What are the positive aspects of this development?

- Chemical weapons could be less aggressive.
- Better medicine if we study the brain more.
- The brain is so powerful that we have to continue studying it.
- More focused research on Bi-polar, Alzheimer's etc.
- More research into how chemicals affect the brain, e.g. Mobile radiation.
- More research on how the brain helps people get better.

What are the negative aspects of this development?

- If we learn how to cure depression, we can learn how to cause it.
- This research could be used for manipulation.
- This research could be used to control democratic processes and also to brainwash people.

What kind of dilemmas will this development cause?

- Human testing
- Ethics
- Who will get the treatment first?
- Are we creating new diseases?
- Who will get the personalised medicine first?

Do the positive aspects outweigh the negative? Or vice versa?

- 5 positive
- 0 negative

Are you concerned that this kind of research/development is carried out?

- 4 "yes"
- 1 "no"



TABLE 2, Medicine

What are the positive aspects of this development?

- It all boils down to the way it's used.
- Improvement is always good.
- Efficiency
- Precision
- New solutions
- Earlier diagnosis

What are the negative aspects of this development?

- Inducing illness for potential pharmaceutical companies to become billionaires.
- Synthetic drugs
- Enforcement – like doping athletes, pushing limits etc.
- The unknown long-term effects.

What kind of dilemmas will this development cause?

- Killing ourselves until we see the side effects.
- Solving one problem and creating another.
- Are we questioning what they are giving us?
- Personal volition (for example: soldiers in combat)

Do the positive aspects outweigh the negative? Or vice versa?

- 6 positive answers.

Are you concerned that this kind of research/development is carried out?

- All the six participants were directly positively concerned.



TABLE 3, Medicine

What are the positive aspects of this development?

- More accurate diagnosis.
- More information about different illnesses.
- All knowledge is positive.

What are the negative aspects of this development?

- Medical solutions could have positive effects but fall in the wrong hands.
- Removing emotions.
- Dehumanisation.
- Misuse.

What kind of dilemmas will this development cause?

- Intentions
- Ethical formation
- Usage by whom
- To what extent

Do the positive aspects outweigh the negative? Or vice versa?

- Positive (x3)
- Balanced (x3)
- Negative (0)

Are you concerned that this kind of research/development is carried out?

- Concerned (0)
- Not concerned (x5)
- Balanced (x1)

TABLE 4, Medicine

What are the positive aspects of this development?

- More predictability;
- Personalisation of treatments;
- Lower combat casualties;
- The multitude of diseases that have the potential to be treated.

What are the negative aspects of this development?

- Knowledge about preventing can sadly be perverted to increase one's ability to cause or worsen such afflictions.
- Excessive medicines may lead to abuse, leading humans to live only on medicine.
- It may be all about business development and less about the human quality of life.

What kind of dilemmas will this development cause?

- More negative impact
- Mixed feelings

Do the positive aspects outweigh the negative? Or vice versa?

- The group expressed mixed feelings in regards to this this.

Are you concerned that this kind of research/development is carried out?

- "Slightly concerned".
- "Sceptical about this situation".



TABLE 1, Artificial Intelligence

What are the positive aspects of this development?

- Improves the quality of life in patients.
- Improves the quality of life in the elderly.
- It could prevent wars.
- Easy access to information.
- Less time consuming.

What are the negative aspects of this development?

- The information may fall in the wrong hands.
- Dystopia where robots take over.
- Unethical uses.

What kind of dilemmas will this development cause?

- Ethical issues.
- Becoming dehumanised + heavily reliant on it.
- Dependence that strips emotions.

Do the positive aspects outweigh the negative? Or vice versa?

- 50/50
- "We are already dependent on Artificial intelligence".

Are you concerned that this kind of research/development is carried out?

- Yes
- "We are concerned but we are helpless".

**TABLE 2, Artificial Intelligence**

What are the positive aspects of this development?

- Efficiency
- Helping humans
- Improving science
- Emotionally humans may be biased.
- Easily to find.

What are the negative aspects of this development?

- Losing jobs.
- Reduction in humanity.
- Can be misused by government and military.
- Instant gratification.

What kind of dilemmas will this development cause?

- Lack of regulations
- What will happen with the human life?
- When do we stop?
- We might have to rethink the wages due to people being out of jobs.
- Less human interference
- Less rewarding when we do things.

Do the positive aspects outweigh the negative? Or vice versa?

- Mostly positive but if misused it will be a catastrophe.

Are you concerned that this kind of research/development is carried out?

- Concerned since we have no control.
- Always depends on how it is used.
- Good to be concerned as it means that we are aware.

**TABLE 3, Artificial Intelligence**

What are the positive aspects of this development?

- Improves human life through the increase in intelligent systems such as cleaning assistance and logistical aid.
- Computer intelligent systems remove human error.

What are the negative aspects of this development?

- Laziness
- “Too much supervision”.
- “Lack of human control”.

What kind of dilemmas will this development cause?

- War
- Threats against humans
- Lack of empathy
- Final decisions made without morality.

Do the positive aspects outweigh the negative? Or vice versa?

- The group did not feel any strong opinion on this topic, rather feeling split between good and bad.

Are you concerned that this kind of research/development is carried out?

- The group felt rather concerned about what the future held but at the same time were excited about future developments.

**TABLE 4, Artificial Intelligence**

What are the positive aspects of this development?

- Mankind gaining more knowledge about mankind.
- Help humans where physically limited.
- Going beyond human limitations
- Not biased
- Not run by emotions
- More humans overseeing robots, e.g. Surgeon.

What are the negative aspects of this development?

- Loss of jobs
- Glitches in artificial intelligence could lead to disastrous consequences.
- No longer appreciating our own humanity.

What kind of dilemmas will this development cause?

- Main intentions.
- Bias

Do the positive aspects outweigh the negative? Or vice versa?

- Positive (x3)
- Negative (x 1)
- Neutral/balanced (2)

Are you concerned that this kind of research/development is carried out?

- Yes (0)
- No (x 6)
- Neutral/balanced (0)



TABLE 1, Brain-computer interfaces

What are the positive aspects of this development?

- Medical wise.
- Advances in lifestyles.
- Extend mental/human capability.
- Technology that is immersive and interactive.

What are the negative aspects of this development?

- Health-wise – radiation.
- Invasion of privacy.
- Manipulation of thought process.
- Addiction
- Politically/military exploitation.

What kind of dilemmas will this development cause?

- Survival of the fittest
- Dilemma controlling energies
- Will we manage to control what we created?
- Changing our values – privacy as interpreted by people who lived in a world without social media, so they may be naïve in their approach.

Do the positive aspects outweigh the negative? Or vice versa?

- Positive (x3)
- Negative (x2)

Are you concerned that this kind of research/development is carried out?

- Research is essential.
- Honesty
- Ethical standards.
- Importance of education and awareness.



TABLE 2, Brain-computer interfaces

What are the positive aspects of this development?

- Funds allocated to positive issues- such as giving vision to blind people.
- Less loss of life.
- Amputees regaining limbs.
- Communicating with coma patients.
- Adding more functions.

What are the negative aspects of this development?

- Invasive
- Big brother watching
- We can lose our basic human senses.
- Unfair advantage in military usages.
- Lack of originality if it had to take over.

What kind of dilemmas will this development cause?

- Is the society ready for such progress?
- The gap will keep getting wider.
- Dilemma of control.
- Will we become killing machines?
- Is it taking over our emotions?
- Over population
- Ethics.

Do the positive aspects outweigh the negative? Or vice versa?

Even though all the above, the whole group agreed that this development is positive.

Are you concerned that this kind of research/development is carried out?

- Yes (x2)
- No (x3)

**TABLE 3, Brain-computer interfaces**

What are the positive aspects of this development?

- Can help a lot of people.
- Even military application can be positive.
- A good revolution.

What are the negative aspects of this development?

- Sometimes they are gimmick.
- The fact that one can play with memory.
- It can manipulate people.
- Can it have an impact on the personal?
- Loss of privacy.

What kind of dilemmas will this development cause?

- When to stop?
- To who will this be available?
- Costs
- Level of power.

Do the positive aspects outweigh the negative? Or vice versa?

- For now, more positive than negative.

Are you concerned that this kind of research/development is carried out?

- Having a full army with computer brains.
- Regulation
- The consent of the respective person.
- Interfering with nature will always be a repercussion.

**TABLE 4, Brain-computer interfaces**

What are the positive aspects of this development?

- Medical use such as spinal and neural cures.
- Improved methods of education.

What are the negative aspects of this development?

- Possibility of someone else controlling you.

What kind of dilemmas will this development cause?

- Technology taken too for granted.
- The threat of 'super soldiers'.
- Hacked systems and viruses.

Do the positive aspects outweigh the negative? Or vice versa?

- The group felt slightly more positive towards this topic.

Are you concerned that this kind of research/development is carried out?

- The group was happy that this research is being carried out but was also concerned about who was conducting it and for what purpose.



Annex 7.3 – Translated templates from round 3

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Ethics	3)When should quality of life overrule quantity of life, and when should one draw a line? 11	2)How can research findings be limited for ethical use? 8		1)Who would be responsible to draw the line or shut down research if it starts to cross over dangerous boundaries? 5
Education	4)How can we ensure that the advances in neuroscience are accompanied by investment in education and ethical studies? 15		4)How can we ensure that the advances in neuroscience are accompanied by investment in education and ethical studies?	
Funding		10)What is the objective and what are your priorities about the human being? On whom are you testing your product? Are you being funded by 3 rd parties? Who are they? 3		
Medicine	6)What can be done with regards to legalisation of marijuana more worldwide, and what can be done about the 'redtape'? 5	11) Who gets to choose what population gets chosen for a particular type of trial? 1		
Military	5)How are you drawing up controls? Would you be open up this research for the military and if you intend to , what parameteres are you putting up? 4			
Legal and control		7)What can be done for people who are less min and what can be made to stop brain washing? 2	8)How are you ensuring that you do not manipulate any decisions that might not leave the human as the most important element of all research? 4	9)Do you know what rights you have? Do you feel that research is taking up any of your privacy or your life? 6



TABLE 2, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Holistic Education / Ethics	<p>1) Will the European Communities still be willing to fund such development if there was no money making involved? Would not it be more ethical is the citizens were to be given more holistic education about the matter rather than just academic? 22</p>	<p>Will the European Communities still be willing to fund such development if there was no money making involved? Would not it be more ethical is the citizens were to be given more holistic education about the matter rather than just academic?</p>	<p>Will the European Communities still be willing to fund such development if there was no money making involved? Would not it be more ethical is the citizens were to be given more holistic education about the matter rather than just academic?</p>	<p>Will the European Communities still be willing to fund such development if there was no money making involved? Would not it be more ethical is the citizens were to be given more holistic education about the matter rather than just academic?</p>
Education	<p>2)More education to teach people in terms of technology, teach children reality and parents on how to be more responsible for their children. 4</p>	<p>6)Can children be educated how to play with technology? It seems like we are feeding a monster called addiction instead of helping brains. 8</p>		
Local funding	<p>3)What funding is being given for Parkinson's and Alzheimer's? Is the proposed treatment in the research available in Malta? 2</p>	<p>3)What funding is being given for Parkinson's and Alzheimer's. Is the proposed treatment in the research available in Malta?</p>	<p>3)What funding is being given for Parkinson's and Alzheimer's. Is the proposed treatment in the research available in Malta?</p>	
Medicine	<p>4) Can there be more research to cure disease ? To facilitate people's life and less research to destruct the population? 15</p>			
Medicine	<p>5) What is being made to enhance the daily living/ future of persons with neurological conditions and autism to calm down impulses naturally and focus more on their abilities and potentials without the use of chemicals? 9</p>			



TABLE 3, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Ethics	1) Who is going to enforce ethical regulations and access? 13		8) How can we be sure that there will be no repercussions from the outcomes? Avoiding a big brother scenario 14	
Consent	6) Who is the ultimate beneficiary? 1	3) What measures are researchers taking when it comes to safety during the process of testing? 13	7) Who will have access to the research made? Will it be freely available to the public or sold to the private companies and marketed to end-products? 4	2) How willing are you to attach a permanent implant to your brain, if it means it can release limb functionality and improve brain performance, but at the expense of unknown side effects? 5
Artificial Intelligence	4) Who will make sure that the initial data does not contain bias? 3	5) Who has access to the technologies that are created? 6		



TABLE 4, Template 6

Themes suggested by the group	Policy-makers ³	Researchers	Stakeholders	Citizens
Ethics/Transparency/	1)How could block chain technology be incorporated with the aim of ensuring transparency, promoting accountability and ethical furtherance application of research and technology?		How could block chain technology be incorporated with the aim of ensuring transparency, promoting accountability and ethical furtherance application of research and technology?	
Transparency	2)Are there enough regulations regarding ethical aspect of artificial intelligence and medication? ¹²	Are there enough regulations regarding the ethical aspect of artificial intelligence and medication?		
Education	3)Research into the educational system so that from an early age the child adapts to think for himself/herself rather than indoctrinate with knowledge, the child is thought skills and values so that they are better equipped to use artificial intelligence responsibly without being impressionable. ⁹	Research into the educational system so that from an early age the child adapts to think for himself/herself rather than indoctrinate with knowledge, the child is thought skills and values so that they are better equipped to use artificial intelligence responsibly without being impressionable.	Research into the educational system so that from an early age the child adapts to think for himself/herself rather than indoctrinate with knowledge, the child is thought skills and values so that they are better equipped to use artificial intelligence responsibly without being impressionable.	Research into the educational system so that from an early age the child adapts to think for himself/herself rather than indoctrinate with knowledge, the child is thought skills and values so that they are better equipped to use artificial intelligence responsibly without being impressionable.
Non dependency			How will you ensure that you will retain a degree of independence, or at least non-dependence upon research + technology that result? ²	
Political	4)How can researchers guarantee that our civil rights are safeguarded while nowadays research is such important? ¹⁴	How can the results that come out of a study be safeguarded for good use?		



TABLE 5, Template 6

Themes suggested by the group	Policy-makers 5	Researchers	Stakeholders	Citizens
Medical cure	1) Could there be an overall solution to brain illnesses, such as music etc.? 19	Could there be an overall solution to brain illnesses, such as music etc.? 9	Could there be an overall solution to brain illnesses, such as music etc.?	
Research	2) Who/ what regulates usage, intention, results, products algorithms, methods, dosage. 21	3) Will the research (HBP) be accessible and free for all?	Who/ what regulates usage, intention, results, products algorithms, methods, dosage.	
Funding	4) Can you ensure that findings for this project comes from an ethical source which has no negative bias?			
Medicine		5) What kind of treatment, side-effects does medicine have? How long will it take to be minimised? 6	What kind of treatment, extent, side-effects does medicine have? How long will it take to be minimised?	



5 **TABLE 6, Template 6**

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Brain Computer Interfacing		1)As regards to BCI, is the intention to suppress human emotion? 1	1	
Artificial intelligence			2)Are you ready to take orders from a robot with Artificial intelligence at your place of work?	
Medical	3)What is the aim of this research to improve my wellbeing towards neuroscience development? 13			
Artificial Intelligence		4)Who will switch off the supply to all robots? 5		
Medical / BCI	5)How will robotic aids be made available to those in need? Will they only be available to those who can afford it? 12			
BCI		6)Will the financial backers of the BCI project pledge to publish all data which will help improve human life and not hinder it? 5		
Medical	7)Knowing that high precision medicines would produce fewer side effects, will the governments finance these medicines to help all and not only those who can afford? 2			
Policy	8)What checks are in place or will be put into place counter systems or services for users with malicious intentions? 21			

Annex 7.4 – Results from morning survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

(mark the answers that you agree with the most with an X)

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (choose one option)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
7	5	6	8	6

- 2) If publicly funded research has dual use potential, should it then be allowed? (choose one option)

a. Yes	28
b. No	2
c. I don't know/do not wish to answer	2

- 3) As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? (choose one option)

a. Yes, the most important thing is to make progress in the research.	12
b. Yes, but only if it is based in another EU member state.	2
c. Yes, but only if it is based in an allied country of the European Union	1
d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons	13
e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.	4
f. I don't know/do not wish to answer	0

- 4) The European Commission has a big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? (choose one option)

a. Yes	24
b. No	3
c. I don't know/do not wish to answer	5



Annex 7.5 – Results from afternoon survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? *(choose one option)*

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
7	6	5	8	6

- 2) If publicly funded research has dual use potential, should it then be allowed? *(choose one option)*

a. Yes	19
b. No	5
c. I don't know/do not wish to answer	8

- 3) As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American “Brain Initiative” or the Chinese “China Brain Project”? *(choose one option)*

a. Yes, the most important thing is to make progress in the research.	12
b. Yes, but only if it is based in another EU member state.	1
c. Yes, but only if it is based in an allied country of the European Union	0
d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons	13
e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.	5
f. I don't know/do not wish to answer	0

Note: One of the participants forgot to provide an answer to this question.

- 4) The European Commission has a big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? *(choose one option)*

a. Yes	21
b. No	5
c. I don't know/do not wish to answer	6



Annex 8: Country Report - Portugal



Human Brain Project

Citizens' view on neuroscience and dual use

[Portugal]

Authors/Compiled by: Mediatedomain, Lda.



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Summary of results

On 25th of November of 2017, the Human Brain Project promoted a face-to-face consultation in Lisbon, making citizens reflect on the possible dual use of brain research. When asked about why they wanted to participate in this event, citizens mainly mentioned: a) the importance of openly discussing ethical issues related to brain research to avoid its malicious use; b) their interest and concerns about neurosciences, artificial intelligence, automatization and the abusive and invasive use of new technologies; c) participation as an opportunity to learn more about the subject (curiosity), to contribute with the citizen's point of view to the development of research and to talk about issues that are usually not approached in everyday life but have a major impact on society.

During the face-to-face consultation, firstly, some overall principles of research and dual use were explored, then participants worked on three areas where the research results could be used – medicine, artificial intelligence and brain-computer interfaces – and, finally, they elaborated questions that need to be addressed in the future. During the event, some general comments emerged, both related to this initiative and to the subject itself.

Citizens revealed a significant level of distrust concerning what can effectively be done to avoid that brain research is used for military purposes (it was often mentioned that - no matter what is legislated or regulated - the military will probably be able to have access to the research they find useful). Citizens were also concerned about the project ethics itself as they felt some of the provided material as ambiguous and biased (e.g. most of the examples of applications provided by the project were focused on the positive side). There was a vague feeling among participants that the project materials were intended to lead participants during the consultation to expected answers. Another common comment was that these are no linear questions and that a responsible opinion should also consider other aspects – participants did not always feel able to fully cover the issues under discussion since they are unaware of the many possibilities of brain research. Some even referred that it would be very interesting to have somebody from the military at each table to provide a more complete picture of the issues under discussion.

Throughout the day participants mentioned often, that brain research can have simultaneously positive/constructive and negative/destructive impacts. However the conversations focused mainly on the concerns citizens have: (a) the possibility of humans losing control over technologies and machines that work with artificial intelligence, (b) the supervision and control that is being made of the many ethical challenges that the HBP poses and the research and technologies it develops, and (c) the use of these developments by individuals, organisations and states that do not respect human rights, individual privacy and the right of societies to freely exercise democracy.

Some of the debated issues revealed to be more consensual, while others caused more discussion. Among the three areas where the research results could be used, medicine was the one that gathered more agreement, being considered an area where foreseeable developments will be more beneficial for humans and their well-being. Talking both about drugs and medical advances, its potential to improve the human condition, treatments of diseases and physical disabilities was pointed out as a major benefit. However, to what extent it will be beneficial to turn people into “super-humans” is something that needs further discussion, participants said. The issue that was consensual across all groups was the need to create specific regulations, legislation and supervision of the brain research and its possible applications.

On the other hand, there was a lot of discussion on the possibility of military using brain research in its multiple forms to control both civilians and/or enemies (the main issue here is that developments that are



most needed, can also lead to improper use by others with serious consequences) and on the free access to research with dual use.

Results from Round 1: Research and Dual Use - Overall principles

The first activity of the first round aimed at introducing citizens to the overall subject under discussion, the methodology and to other participants. They were asked to, individually, write on a post-it what they think when they hear the word neuroscience. Most citizens mentioned the study of the brain and the nervous system and associated the word “neuroscience” to words such as: research, science, medicine, knowledge, progress, development, future and restlessness. There were also references to the processes of the mind (thoughts, reasoning, building of ideas), to some concerns - like the military use and ethical issues - and to the role of neurosciences regarding the well-being of Man and the treatment of brain diseases. Two main Portuguese personalities in this field were also mentioned: António Damásio and António Lobo Antunes.

Most discussions at the tables focused on the possible negative/destructive use of the research results. On the one hand, citizens are concerned about the misuse of brain research and related technologies – not only by the military or intelligence agencies, but also by malicious individuals or companies that are not necessarily related to the military and can take over these developments. On the other hand, they believe that the military will have access to the research if they want, regardless of any laws and regulations to prevent it, and are also concerned about the brain research and the use of related technologies that the military is already carrying out without civil society’s knowledge. Despite this, commonly believing that the dual use is inevitable, citizens called for sound legislation on this subject and precaution on the development of research and partnerships – it is important to remember that not all operate under the same rules and values. Citizens also noted that military use does not automatically mean negative/destructive use and required that this should be taken into consideration as well.

The questions that caused more discussion were if the HBP should collaborate with other brain research initiatives/organisations related to the military (and other) and if it should fund civilian research of organisations that also develop military funded research. As to the first question, many asked what does “collaborate” mean here? How would this collaboration work, in what conditions, to what level? The ambiguity of the question was pointed out as an obstacle to provide concrete answers. Yet, despite the high and unknown risks, it was mentioned that the sharing of knowledge is an important process of influence and risk control, contributing to the definition of ethical limits and standard levels of supervision, the optimisation of resources and the promotion of more cohesive societies. The discussion on the second question was felt as difficult, because – as stated – the rules of funding are unknown for most citizens. Some groups saw the co-funding of brain research by the HBP and the military as a synonym of an investment in the development of technologies with probable negative/destructive effects. Others concluded that it could be permitted if the rules, purpose and means to develop the research were very well defined and – above all – transparent. The quality and conditions of the organisations (civil or military) receiving the co-funding was pointed out as an important aspect of the decision, although citizens do not trust that there will be no cross-contamination of information.

The need to provide sound regulation and effective control and supervision on dual use was consensual across groups. Citizens believe that this regulation is important to be developed at an international level, regulating all brain research developments, thus providing a more secure framework for some important breakthroughs in this area and for partnerships as well. The continuous monitoring of ethical issues is seen as crucial and the non-compliance of regulations should be considered in future debates (that should include all societal actors).



Despite all concerns, it was consensual in most groups that if brain research could contribute to the progress of science, technology and society, it should be developed.

Results from Round 2: three areas of research

Medicine

In some groups, this was the research area that caused most discussion, in others the one that was more consensual. Citizens agreed that developments in this area would be mostly positive, because its progress is of similar interest both for citizens and the military, particularly when it potentially improves treatments for brain diseases. But others thought that the examples provided by the project were too positive, not revealing the downside of developments in this area. This suspicious attitude contributed to a more complex discussion.

Citizens identified many positive and negative aspects of developments in this area of research. Generally, they think that the positive aspects (mainly focused on the improvement of our well-being) surpass the negative ones. However they demand a lot of caution to ensure that this is the case in practice – specific conditions, regulations, legislation, ethical reflexions (e.g. what is positive and justifiable for some might not be so for all) and guidelines, as well as supervision is very much needed for the development of this research and its application. Yet, most groups revealed to be concerned about developments in this area, pointing out that principles and values are not standardised around the world and the respect for the human life and dignity should be a cornerstone of these developments. Citizens expressed a fear of manipulation becoming a common practice to control people, and that the powerful economic interests of pharmaceutical companies may overrule any political efforts. Furthermore, they mentioned the possibility that impacts are not considered in due time.

During the discussions at the tables, citizens identified multiple dilemmas that can arise from developments in this research area: (a) how to ensure that medicine will be used for the intended purposes, (b) to what extent is it beneficial to improve human conditions, (c) which are the limits of usage and who gets to define them, (d) will it be possible to provide equal access to everyone or will this exacerbate social inequalities, (e) how to prevent that economic interests take over these developments (in particular, the ones that are essential for the functioning of human beings) and how to guarantee that exploitation does not happen or that increasingly important quality criteria are met, (f) how to monitor and control abusive use and (g) what are the limits of informed consent?

Artificial intelligence (computer learning)

In general, this is the research area, that arouse most interest by citizens (there were continuous comments on that – from the moment they registered for participation in the consultation to the discussions at the tables), causing intense and dedicated discussions. One of the issues mentioned across tables was, that citizens do not fully understand the potential of technological advance in this area and thus cannot foresee the (global) impacts of future developments. Based on what they know, citizens tend to believe that, currently, positive aspects of developments in this area may still slightly surpass the negative ones.

The problem here is how serious can negative aspects turn out to be in the future – especially regarding the possibility of humans losing control over machines. The two main concerns citizens have with respect to artificial intelligence are the growing importance that machines will have in the future, putting the human



being in disadvantage, and the increasing autonomy and ability of machines to self-learn which may interfere with the human decision-making power. Although developments in this area of research are thought to be important because of the positive impact it will have in the quality of life of human beings, citizens are also concerned with the possibility of unauthorised surveillance and undue control of people, manipulation of the technologies and information by the programmer/operator and lack of transparency and literacy. Once more, regulation, legislation and supervision are demanded by the citizens.

Some dilemmas mentioned by the citizens regarding artificial intelligence are: (a) how to define a balanced power relation between man and machine, (b) what are the rules/limits that we can and should establish for the operation/decision-making of machines, (c) who is responsible for these decisions, (d) will we be able to stop developments if they prove to threaten human beings, (e) how to address the lack of empathy, human values, sense of identity and belonging to any culture, (f) how to ensure that man does not get overly dependent on machines becoming at risk to lose its competences and critical thinking, (g) will these developments increase or decrease the possibility of war, the freedom of expression, the right to exercise one's liberties in a democratic way, and (h) how will the protection of data or the rightful programming be ensured.

Brain-computer interfaces

Like the discussions on artificial intelligence, citizens believe this area calls for future developments. However, since the examples provided were seen as too positive, citizens felt they did not have enough information on the downside to conclude about whether positive aspects surpass the negative ones or not. In each group citizens revealed concerns about developments in this area of research. They commented on a possible future where emotions and feelings seem no longer to have a place and the fact that these developments can lead to the loss of privacy and identity. Citizens mentioned the need to study its consequences much further and to provide ethical guidelines to ensure its rightful use in relation to the monitoring and managing of the systems, its safety for the user (e.g. against hacking) and the reliability of the hardware. Again, specific regulation and legislation must be developed and supervision must be implemented.

The dilemmas identified by the citizens across tables focused on multiple aspects: (a) the virtualisation of society and consequent decrease of social competences, namely empathy; (b) the manipulative potential of these technologies, leading to the loss of free will and decision-making power; (c) the need to ensure that everyone has access to these developments to prevent the increase of social inequalities; (d) the clear identification of who is accountable; (e) ethical issues, e.g. accessing the mind of people in vegetative state; (f) to what extent the improvement of the human being is beneficial and (g) how to guarantee its use for defence purposes without compromising individual privacy.

Cross-Cutting

In most of the groups, citizens contributed with their own examples of positive and negative applications of developments in the three areas of research. A common comment across the groups in this second round was that the examples provided by the project were too focused on the positive side, which created suspicion among the citizens in relation to the true intentions of the project. While talking about civilian or



military use, citizens said that there are always beneficial and prejudicial applications – it all depends on the use of the research results and therefore it is important to bring all the possibilities, implications and effects to the table, to allow a comprehensive discussion.

The major concern pointed out by citizens in this round were (a) how this research is being developed (will the public know everything that is being studied/developed?), and (b) who will use this research and to what ends. The need of ethical supervision of the research and of its application (c) was again mentioned by citizens across the areas, as well as the need to develop legislation and regulations that consider future misuses of the brain research (d). Another concern that arose from the discussions at this round was (e) the potential of exclusion and the increase of social gaps regarding the use of artificial intelligence and brain-computer interfaces. Citizens believe (f) that the access to these technologies must be global and democratic.

Results from Round 3: Questions to address in the future

In this last round, citizens were asked to write individually some questions, which to their opinion should be addressed in the future by different social actors. In their groups, they organised the questions into themes and actors and, finally, everyone was invited to vote for the two questions of each group they found to be most important. Below we present the 11 most voted questions or group of questions (10 votes or more).

1. What are the mechanisms to control the use of the project results? | How will the use of this information by third parties be regulated? | How will the budget execution of the project be controlled? Are you planning to advertise it?

Theme: Process and Product Monitoring; **Actors:** Policy-makers; **Number of votes:** 14

2. How to put limits to the political/ economic/ military use by institutions with malicious intentions? | How to ensure the ethical/ moral integrity of the programs/ games (brain-computer interfaces) to which people will submit themselves without great scrutiny?

Theme: Monitoring of research processes; **Actors:** Citizens; **Number of votes:** 14

3. How far is it beneficial to increase human potentialities?

Theme: Human development vs. "Super-Human" development; **Actors:** Policy-makers; **Number of votes:** 13

4. How to ensure access to information (for everybody)? | What is already being done and what impacts does it have or had (public unawareness)?

Theme: Information sharing and dissemination; **Actors:** Policy-makers; **Number of votes:** 13

5. What are the limits that the State imposes to the double use? | Will there be a global coordination and sharing of relevant information from different projects? | Who decides what is ethically correct or not regarding the use of this information? | How do these projects jeopardize the security of citizens? | How do these projects bring benefits to society? | What care will be taken in disclosing sensitive results?

Theme: Concerns about dual use; **Actors:** Policy-makers; **Number of votes:** 12

6. How will policy makers premeditate the access to information and decision-making in matters that directly involve the people they represent? | What about the accessibility? | Disaster relief organizations in natural disaster situations should have access to this technology | Democratization, equity (inclusion vs. exclusion), access to drugs and devices

Theme: Accessibility (information, results, materials, process, dissemination); **Actors:** Policy-makers; **Number of votes:** 11

7. Supervision by policy-makers: does legislation and a regulatory entity already exist for these studies? If yes, how to improve and adapt these studies? / by researchers: funding vs. legislation |



What about regulation? | “Self-regulation” = collaborative and transparent effort (“ethics committee”/ “pilot committee for research”/ “Block Chain”) | Who promotes, who leads (from the 4 “categories” of stakeholders); who “decides”, who “controls” (benchmarking)?

Theme: Self-regulation; **Actors:** Policy-makers; **Number of votes:** 11

8. How can we guarantee that research on the human brain is used for the benefit of the human being and not the other way around?

Theme: Use for good; **Actors:** Policy-makers; **Number of votes:** 10

9. Definition of ethics/values associated with research and use of information | How to guarantee the impartiality and secrecy of results? | Ethics and decision-making power – how to inculcate values in the machine (AI)?

Theme: Ethics; **Actors:** Researchers; **Number of votes:** 10

10. How to ensure the formation of an ethical committee for monitoring advances in AI? / How to control the progress of the AI?

Theme: Focus on the AI; **Actors:** Policy-makers; **Number of votes:** 10

11. What means should be created to ensure that human beings and humanity in general are not abused? | Ethics: to what extent can we rely on the ethics of the human being? Do we (civil society) trust in the ethics of scientists, that they will not cooperate for military purposes?

Theme: Legislation/regulation; **Actors:** Researchers; **Number of votes:** 10

In this round, the high number of contributions testifies that citizens were specifically eager to define questions and influence further actions of the HBP. Around five themes have emerged in each table and approximately 120 post-its with questions were placed in the templates. Some themes appeared in more than one group: ethics, human rights/access to information, social and economic effects, education/learning and citizen engagement, regulation/legislation, monitoring of the processes of research and production/autoregulation and safety. But there were other themes that also proved concerns of citizens: clarification request about the HBP, concerns about dual use, focus on artificial intelligence, funding, liaison/coordination and the future.

One issue, that emerged very clearly in this round, was that all actors should be involved in the discussion of this subject in the future. When citizens placed their questions on the templates, many were duplicated to underline that these were questions to be addressed by more than one actor. Having said this, policy-makers were the most appointed actor in this round and this translates well the often mentioned (in this event) need of regulation, legislation and supervision.

Citizens are very much interested in knowing more about this subject and in discussing it further. They cherish the opportunity to share ideas, point of views and beliefs. But they are concerned about the future and insecure in relation to the mechanisms that should already exist to safeguard the many negative consequences of these developments. Their questions in this round provided somehow a summary of the



group discussions. The most highlighted topics were: (a) democratisation of developments (fight social inequalities), (b) international ethical codes and supervision, (c) education (literacy and critical thought), and (d) human rights and accountability.



Key themes across rounds

Although it was often mentioned throughout the day that brain research can have simultaneously positive/constructive and negative/destructive impacts, the conversations focused mainly on the concerns citizens have: (a) the possibility of humans losing control over technologies and machines that work with artificial intelligence, (b) the supervision and control that is being made of the many ethical challenges that the HBP poses and the research and technologies it develops, and (c) the use of these developments by individuals, organisations and states that do not respect human rights, individual privacy and the right of societies to freely exercise democracy.

Some of the debated issues revealed to be more consensual, while others caused more discussion among participants. Among the three areas where the research results could be used, medicine was the one that gathered more agreement, being considered an area where foreseeable developments will be more beneficial for humans and their well-being. The questions that caused more discussion were if the HBP should collaborate with other brain research initiatives/organisations related to the military (and other) and if it should fund civilian research of organisations that also develop military funded research.

The need to provide sound regulation and effective control and supervision on dual use was consensual across groups. Citizens believe that this regulation is important to be developed at an international level, regulating all brain research developments, thus providing a more secure framework for some important breakthroughs in this area and for partnerships as well. Despite all concerns, it was consensual in most groups that if brain research could contribute to the progress of science, technology and society, it should be developed.

Demographic profile of participating citizens

The demographic and geographical criteria for inviting participants to this event were age, gender, education and geographical zone. To have a group of participants that reflected as much as possible the population in Portugal, we have directed our efforts of recruitment, from the beginning, according to the received registrations. On the 25th of November of 2017, 29 citizens aged between 23 and 86 years participated in the face-to-face consultations of the Human Brain Project on the possible dual use of brain research that was held in Portugal.

As the tables below show, the criteria regarding the level of education was the one with the strongest deviation – citizens with high educational level are overrepresented and there were no participants with lower levels of education. However, relatively to the other three criteria the diversity was ensured, and there was a very close match to the percentages of the general population. The general statistics are based on 2011 Census.

In the end of the consultation, citizens filled in an evaluation questionnaire. When asked about what they have liked the most regarding the event, around half of the citizens highlighted the diversity of participants and the sharing of ideas with people from different backgrounds and with different points of view.

Data on the participating citizens:

Age:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
18-29:	8	6	20,7% (event) 17,0% (PT)
30-39:	4	3	10,3% (event) 18,5% (PT)
40-49:	8	4	13,8% (event) 17,8% (PT)
50-59:	8	6	20,7% (event) 16,2% (PT)
60-69:	6	6	20,7% (event) 13,7% (PT)
>70:	4	4	13,8% (event) 16,8% (PT)

Gender:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the gender group compared to the general population
Women:	23	16	55,2% (event) 52,2% (PT)
Men:	15	13	44,8% (event) 47,8% (PT)
Other:	0	0	0

Education	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the education group compared to the general population
Primary and lower secondary education:	0	0	0 64,5% (PT)
General upper secondary education:	1	0	0 18,9% (PT)
Vocational Education and Training:	3	3	10,3% (event) 0,8% (PT)
Bachelor or equivalent:	7	4	13,8% (event) 13,9% (PT)
Masters or equivalent:	21	17	58,6% (event) 1,6% (PT)
Doctoral degree or higher:	6	5	17,2% (event) 0,3% (PT)

Geographical zone (percentage of population living in...)	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the geographical zone group compared to the general population
City:	26	17	58,6% (event) 43,3% (PT)
Town:	8	8	27,6% (event) 29,2% (PT)
Rural:	4	4	13,8% (event) 27,5% (PT)

Other aspects of relevance in your country?

Another geographical aspect that we think is relevant it's related to the Nomenclature of Territorial Units for Statistics (NUTS), which are the statistical sub-regions in which countries are divided. In Portugal, NUTS II comprise seven Territorial Units, from which five are in mainland (North, Centre, Lisbon, Alentejo, Algarve) and two in the Autonomous Regions of the Azores and Madeira. In this consultation, we had citizens from four of the five mainland Territorial Units (North, Centre, Lisbon and Alentejo) and none from the Autonomous Regions, which are always a difficult target when the events take place in mainland.

TABLE 1, Template 1

Annex 8.1 – Translated templates from round 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- Yes! "It is fatal!" However, it will happen!
- Nowadays the access to results of investigation is easy and everything can be bought. It is important that the results reach the civilians and the military. The question is: for what will they be used. Also in civilian applications, the results can be used for evil! (family and colleagues can also be manipulated.) The military system and the civilians have to have their say because both are part of society.
- The military part of the state – do we compact com inevitability?
- Legislation is needed although there will be countries that will not comply with the rules.
- Publicly funded investigation should never ever be used for military purposes.
- Do not divide ... Everyone must participate → based on the decisions, ethical considerations must be carried out.
- Yes: Europe should not be left behind → the others (China) also do this research for military purposes – this is the only strong reason to promote military investigation.
- Will it be good or bad? The application can also be to pacify people.

Do you find it problematic or reassuring? Please explain (why/why not).

- Worrying, because it can end with humanity, as we know it. The future could be much worse.
- Worrying, as it is often not possible to identify the application of results physically (contrary to nuclear weapons – control here is easier).
- Altruistic / slave people, supermen can be created – a lot is possible.
- Is it good or bad? The application can also serve to pacify people.
- We can create super soldiers → without moral, without physical needs, that have great forces → some countries can have them, others might not.
- The inequalities between social classes / countries will increase.
- Democracy can end ... and then? Dictatorships of the powerful will be the result!
- Will the transition of results to the military be visible? Will there be referendums or polls? Scientists are very competitive → they look more towards the advancement of science and their own investigations and careers than to "responsible" use.
- The potential for manipulation is worrying → we must also think about abuse of this investigation by sects (religious or other)

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Lack of control – what is used or not – and what is given to the military.
- Can be easily hidden – e.g. many interventions can be controlled by a simple mobile phone.
- People are not altruistic by nature and will abuse (one out of 100 possible applications is enough – so abuse will be normal in day-to-day live).
- It can be good, for example when catching a spy – by using a "truth serum" there is no longer a need for torture.
- Memory chip → can cause people / soldiers to remember everything (or not, when memory is erased on the chip).
- Telepathy can make the intervention of the army obsolete (this may be good), as this will manipulate the enemy directly.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

Yes – defence is there to protect us
 No – allies with time can become enemies – and turn against us.
 If it is for defence, it can be used also for attack.
 No – a defence can actually be an attack – we never know.
 No, the current government define terrorists as "against the system" – so the measures can be used against innocents in the civilian population (as we now see in Turkey).
 Yes – Europe cannot be left behind – others (China) also do this research for military purposes – this is the only strong reason for military research – the problem is the border between civil and military applications (how to decide safely).

TABLE 1, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Yes / No (indifferent in certain countries because the social formatting of people already conditions values and visions)

Please explain why/why not.

Yes:

- The projects are useful for civil research – results are based on others / previous ones
- Joint investigation equals commitment, research institutions sit at the same table together. This makes them feel mutually involved and ethical issues are considered
- What happens in other countries will be known. There might be also good results for civilians
- We will know much more – this will exponentially augment knowledge
- This will save costs because there will not be similar double-fold investigations that go into the same direction.
- There will be moments of sharing; the "hiding" will disappear.

No:

- Pure civil investigation may take longer but then it reaches the same results. Military involvement is not necessary. However, civil research is not always slower. The Champalimaud Foundation is civil and does very innovative research.
- Other (governments, countries) will not share advanced research results. In principle, there will be no transparency – there are certain countries / regimes that will not reveal their trump cards.
- It is not sure how the military will use the results because they can go against human rights, for example.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- We can never be sure, whether the result – financed by public money – will not be subverted and turn against those who financed it, in this case the European taxpayers.
- How to control that civilian investigation remains civil when performed by military institutions.

Please explain why/why not.

Yes:

- In case military partners are better (or farther forward) researchers than civilian research partners.
- When military partners already have expertise in the topic.

No:

- Will the application remain civil? Use for military purposes is often quicker.
- Distrust in Military Institutions! They can fund certain investigations with public money and use their own money (military budget) for bad things – so public funding ends up saving military budgets.

TABLE 2, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- Essentially, there is nothing wrong with this dual use, but it must be controlled/regulated/monitored and supervised.
- Although it has happened so far and it seems an inevitability, it is extremely dangerous and can jeopardize human existence.
- The use for military and/or intelligence purposes has been going on for a long time, but civil society is unaware of the impact. The risks should be debated.
- I do not think that military use is wrong, but power cannot be centred in a single group.
- I have doubts that public opinion can influence the process.
- It is difficult for civil society to change things because of the power of institutions, but we can change the opinion of researchers working in these areas; and we can influence laws. There is power in citizens and civil society/research/ethics institutions.

Do you find it problematic or reassuring? Please explain (why/why not).

It is a problematic situation:

- There are many unknown factors, we do not know what researchers are going to discover yet and how it will be used.
- We do not have access to all the information, we live under the influence of mass media.
- The unknown is always scary.
- (This knowledge means power and) too much power concentrated is dangerous.
- For us – human beings – it is difficult to deal with the unknown and with complexity; and it is to our own interest to accept that we cannot control everything.
- It is problematic to be afraid of what others will do and for that reason we always have the "finger on the trigger".

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Totalitarianism of the State.
- Dictators commanding the military. Those who have power are dangerous.
- We do not control what we do not know and we cannot control those who are far from the spotlights.
- Consequence of AI and the use of AI: how it can affect the human being and humanity as a whole
- Machines might take the power.
- Loss of control/safety/loss of autonomy/supremacy/homogeneity of machines.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- The research should not be used because objectives do not justify the means.
- No, because we run in each case the risk of reaching (hurt/kill) innocents.
- No, because what is seen as defence or counter terrorism may differ according to the political decisions, political system, mood and colour (= which party is governing).
- Defence is always an excuse, but it does not justify the use of research.
- Either situation is negative when knowledge and techniques are not applied responsibly and ethically.



TABLE 2, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

No/Yes

Please explain why/why not.

- No, because the risks are manyfold and unknown; and they are projects with different values and purposes.
- No, because other entities are less controlled.
- By sharing we are giving information away, this is what we do not want and for sure we are giving more information away than we receive.
- Yes, because the sharing process is a process of mutual influence and risk control.
- It depends on the scope and level of collaboration, mutual benefits, rules.
- It also depends on the concept of collaboration.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

No

Please explain why/why not.

- No, because “Chinese walls” do not work.
- No, because there is always interaction and sharing between teams, which goes far beyond what can initially be established.
- No, for the sake of exemption/confidentiality/ethics.

TABLE 3, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- What is open source will be available for everyone.
- Published results: everyone knows about them, which means that everyone can use them and there is nothing we can do about it (we cannot prevent this to happen).
- Civil evolution takes place in parallel with military evolution, so there is an undoubted need to develop tools that mitigate negative ethical impacts.

Do you find it problematic or reassuring? Please explain (why/why not).

- For us, in this context, reassuring means less problematic.
- The existence of an Ethics committee provides a feeling of greater reassurance. The committee must be regulated.
- Reassuring aspects: these types of projects are very scrutinised (by peer-review).
- Problematic aspects: after the results are published, and therefore "out there", anyone can continue the study/research for "worrying" purposes.
- Other organizations raise more concerns.
- Everyone should control and watch over everyone: "governments" should promote public awareness.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- The negative aspects of Artificial Intelligence
- Deviation in human integrity
- There must always be public awareness about the possible use of the research results by the military or intelligence agencies.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- Counterterrorism is defence – we must think about:
- Individual and social awareness and consciousness
 - Ethics and emotional aspects



TABLE 3, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Note: what does “collaborate” exactly mean?

- USA, Europe – when there is involvement of many countries, there is a high probability of intensified and mutual control / projects where only one government (and its perception of e.g. democracy, human rights, etc.) is involved arise much more concern.
- Yes, it must collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies (in the civil component).

Please explain why/why not.

- An international project is more representative of the society as a whole.
- By participating, international collaboration functions as a scrutiny/control and resource optimization mechanism.
- The HBP should collaborate, but it should always remain independent.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

What kind of organization is targeted here? Civil organizations can.

Please explain why/why not.

- No, if it is a military organization.
- Yes, (if it is a civil organization) and always provided that control and scrutiny is identical to that of its promoters (public funding).

TABLE 4, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- There is a need to:
 - Create rules of use;
 - Understand that this is something inevitable;
 - Define the scope of research;
 - Define the concepts of good and evil, from a global point of view.
- It can be beneficial (e.g. demining by robots vs. people/animals);
- We cannot set limits to the dissemination of information or to its scope;
- Just as military institutions helped in the development of civil society, civilian research should also pass on the knowledge to military research – reciprocity;
- The fact that research is military doesn't make it any more frightening because civilian research can also be used for destructive purposes.

Do you find it problematic or reassuring? Please explain (why/why not).

Problematic:

- Warfare use;
- Manipulation of individuals/masses/populations;
- That the degree of freedom/communication/openness in this project is different by the researchers and the military.

Reassuring:

- It may decrease the loss of human lives;
- That good judgement and dialogue arise between civilian and military institutions.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- The loss of control of the research results by the military institutions.
- The use of research to manipulate the brain of people/masses.
- That there might not be any previous discussion between military/civilian/research areas and, consequently, there will be no convention/rules for the use of these results.
- The creation of secret areas, which are not known to civil society.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- It's the same, because it depends on the ethical/good and evil concepts in different cultures;
- The best defence could be the attack.



TABLE 4, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Yes/No

Please explain why/why not.

Yes:

- It contributes to the dissemination of information at a global level;
- With formally undertaken (regulation, conventions, contracts) accountability and commitment among the participants;
- The sharing of information enables the development of more supportive societies, contributing to focus on the beneficial purposes of the research.

No:

- Since the European project is not developing military research, it should not collaborate with projects with military approval/involvement.

Given the possibility of sharing with other projects that have military involvement, the European project should also provide information to its military institutions.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Yes, safeguarding that... (see below)

Please explain why/why not.

- Yes, if the results of the research project are disclosed according to the rules of the HBP → total transparency.
- (Yes,) if the accounting for the HBP funds are disclosed and distinct from the funds of the military institutions.

TABLE 5, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- This is inevitable. However, it must be subject to conditions and supervised (ethics and regulation). There is a need to know if the use of research is done for positive/constructive or negative/destructive purposes.
- The research can promote progress and innovation in society in diverse contexts, but it must be shared with society.
- The use and application of knowledge raise different questions.

Do you find it problematic or reassuring? Please explain (why/why not).

Problematic:

- Whether the information is disclosed and used for destructive/negative purposes
- That non-democratic systems/states can misuse this research
- That these technologies can promote invasion of the privacy

Reassuring:

- Brings intelligence to the defence sector
- Allows the action from defence/avoids large-scale aggression in society
- It can promote health advances

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Which are and who defines the limits of intrusion of privacy/data sharing
- How the results are going to be used
- Supervision – whether it exists or not and how it is done
- The problem of using Big Data to predict societal behaviour and inhibit democratic exercises

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- It makes a difference, but it depends on the ethical/human rights' limits that may be overruled:
 - How far do we go to prevent an attack?
- It depends on the socio-political time/space in which the information is used.



TABLE 5, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- It depends on what is assured regarding the use of the produced knowledge, in an ethical and supervised way.
- Is there an Ethics committee? In what consist its regulations and how is it established?

Please explain why/why not.

Yes:

- It is important to promote the knowledge exchange among scientists to advance innovation and knowledge in the field;
- How to build a (supranational) code of ethics that can be shared by all?

No:

- If not assured: the ethical limits of the interventions/use of knowledge; that the use is not for negative/destructive purposes.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

Most likely not (and if so, with many reservations) – the HBP should not finance organisations that do at the same time military funded research.

Please explain why/why not.

No:

- Because there may be cross-contamination of research/investigations between/within these institutions.
- Research projects in this area should not be concurrently financed by the military and public funds.

Yes:

- If it is possible to ensure that there is not cross-contamination of information/sharing between publicly and military funded research that can lead to military and destructive use.

TABLE 6, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- “(...) will be used” (instead of “can be used”). It depends on which country will use it and for which purpose.
- Rules of EU versus other nations’ rules (deregulated). Here, in the EU, the public participation is taken into consideration, but in other countries, e.g. China (where the State considers no other interests – internal or external) the military intentions and orders aren’t discussed before implementation – the decisions are internal.
- The positive side is that the military has a lot of financial resources, that could be used to do medical research.

Do you find it problematic or reassuring? Please explain (why/why not).

- Frightening: manipulation of the human brain and, when there are a lot of human brains manipulated (mass control), it can lead to the destruction of the planet.
- Less negative: if research is to protect us and for scientific, technologic and cultural advances. This is part of the human evolution (e.g. at the beginning, cinema was frightening).

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- If it is used for destructive purposes (e.g. war) and not for protection (e.g. medicine and research)
- It is invisible (subliminal) and we don’t know the scale of the effects
- The power of robotization, because robots can become a threat to their creator (mankind)

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- It makes a difference because the concept of “defence” in the EU is different from the one in Asia, Middle East, etc.
- It makes a difference if we lost our natural resources – catastrophic situation (our defence might be different depending on the available conditions).



TABLE 6, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

Yes (everyone agrees).

Please explain why/why not.

- To achieve scientific, technological and sociocultural advances.
- Mutual collaboration and learning (e.g. space shuttle: in the past, this process has been supported by competition, but now, the parties collaborate and discuss what to do with data).
- To be aware of what is going on in other countries.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- I don't know how the funding rules work – one participant says this, but after discussion, all agree:
- Yes, but the purposes and means must be well defined.

Please explain why/why not.

- The government always has the final word in terms of defence – it never declines its position on such subject.
- This co-funding can make sense in terms of resource allocation (sometimes the military institutions might be more appropriate for the research). However, the co-funded research must be explicit about the exclusivity of its civil purposes.

TABLE 1, Medicine

Annex 8.2 – Translated templates from round 2

What are the positive aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • It increases the quality of life and the longevity of human beings • It can help people to cope with traumatic post-stress experiences (e.g. accidents, experiencing terrorist attacks, etc.) • It can help change feelings and behaviours (depression, schizophrenia) – “miracles” have been made already in therapies of psychiatric disorders • Innovative drugs can reduce drug side effects • Improves and augments the available therapies for many diseases • Allows more individualized diagnosis, treatment and therapies • Brings hope to healthy and to sick people (e.g. becoming pain free, or being able to undergo more effective treatments) • Opens the way for a dialogue between “traditional” and “natural” medicine 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • It can help soldiers (or war victims) to cope with post-traumatic stress experiences (e.g. war)
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What are the negative aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • Certain drugs create dependencies • Medicine can be developed that are no longer effective when they are taken for a long time • Uncontrollable side effects • Sometimes drugs cause a change in peoples’ behaviour or allow them to be controlled by others in undesirable ways (that is, the patient neither wants nor can control the change) • Taking drugs can be easily “trivialized” • There are drugs that are developed for the destruction of human beings 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • Drugs may intentionally cause certain behaviours that are harmful to oneself (e.g. hallucinations, tiredness ...) • There are drugs developed for the destruction of the human being - this can create a harmful effect on “the enemy” • Stimulus is developed for the soldiers, e.g. make them wish to go to combat or continue in combat beyond their “normal” physical limits • Super powers can be created in soldiers • Drugs can “erase” the memory of certain events (e.g. thinking of spies or soldiers)
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What kind of dilemmas will this development cause?

<ul style="list-style-type: none"> • Will drugs and innovative medicine in general be used for the purposes for which they were developed? • There is a large supply of drugs and therapies for the same purpose (the same disease); this can allow the sales business to control the application • Who pays for the development of certain drugs (and for which purposes)? • Economic interests may overrule the interests of health • Exploitation of countries with less economic power (e.g. medical experiments carried out in these countries without proper control or without any control) • Innovative medicine may allow “selective killing” (e.g. euthanasia). ... and... who decides when about the life or death of whom?
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Do the positive aspects outweigh the negative? Or vice versa?

<ul style="list-style-type: none"> • Yes, for now the positive aspects still outweigh the negative aspects. • Yes, because the human being needs drugs, therapies and medicine in general. • It is difficult to say; however, it is certain that research / development activities in this field need guidelines and ethical criteria. • Positive aspects must continue to outweigh the negative ones.
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Are you concerned that this kind of research/development is carried out?

<ul style="list-style-type: none"> • What worries me is that there is not more research (in general, but also for certain diseases); but there is a need for control and legislation. • Scientific research must always aim at improving the quality of life of the human beings. (the human being is NOT just a means to develop research). • Homogenization of research is necessary, because what is in some countries prohibited, other countries allow. Who decides/controls? The World Health Organization? • There is a need for paying respect for human dignity, and this seems not always to be guaranteed.



TABLE 2, Medicine

What are the positive aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • Increased biochemical precision • Development of new medication for diseases with no known cure so far or for diseases with very expensive cure • Decrease the use of animals in the laboratory • Detecting side effects and adverse effects • Reduction of testing costs • Reduction in the quantity of prescribed drugs 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • Anxiety control • Production of antidotes for chemical and biological weapons
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What are the negative aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • That it does not consider each one's individuality • Environmental contamination • Drug production, leading to increased crime 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • Dehumanization of military apparatus • Disappearance of own will • Individual unaccountability • Production of chemical and biological weapons • Drug production
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What kind of dilemmas will this development cause?

<ul style="list-style-type: none"> • Ethical dilemmas • Coercive use • Limits of use • Who decides? (use and application) • Pressure for use to increase productivity
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Do the positive aspects outweigh the negative? Or vice versa?

<p>This question is difficult to evaluate in abstract.</p>
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Are you concerned that this kind of research/development is carried out?

<ul style="list-style-type: none"> • The problem is not the research itself, but the development and application practices. • Yes, it worries because it depends on: regulation/supervision and ethical principles
--

TABLE 3, Medicine

What are the positive aspects of this development?

- Automatized (robotic) life-saving tests
- We will find out, that we have more brain power than we know
- Good research allows a better understanding of the potential of drugs

What are the negative aspects of this development?

- It will be much easier to understand how to control the human body.
- “Machines” can give us different responses than the human body would do. So, if we trust too much, we will have limited results.
- Destructive warfare purposes.
- Non-visibility of practices and actions, lack of transparency.

What kind of dilemmas will this development cause?

- False negative results/false safety, viruses, hackers
- Will there be the opportunity of accessing the results by all?

Do the positive aspects outweigh the negative? Or vice versa?

Depends on the use of research.

Are you concerned that this kind of research/development is carried out?

Yes.

TABLE 4, Medicine

What are the positive aspects of this development?

- General improvement in the effectiveness of treatments;
- Personalization of treatments;
- Reduction of secondary effects;
- Greater progress in the understanding of mental health;
- Early diagnosis;
- Ability to identify exceptional cases;
- Less environmental impact (of drugs in the environment because of the administration of exact doses that keep drugs from being excreted by humans and animals);
- Sportsman's enhancement;
- New drugs that can increase the creative/recreational side without negative effects.

What are the negative aspects of this development?

Use of drugs on simulations or for unauthorized purposes against the individual or masses' will;
 Mass control;
 New and greater environmental impacts;
 Doping in competitions;
 Non-democratization of access to drugs;
 High price of new drugs;
 Medications that alter consciousness/own will, e.g. control of votes in elections/promotion of inertia for voting;
 About use – indiscriminate use of medicines.

What kind of dilemmas will this development cause?

How to ensure the democratization of access? How to ensure ethical/ benevolent access?

Do the positive aspects outweigh the negative? Or vice versa?

- Positive aspects clearly outweigh the negative, as these developments are fundamentally used to increase the quality of military health.
- Negative aspects outweigh the positive, because neither precautionary nor ethical principles are implemented.

Are you concerned that this kind of research/development is carried out?

Yes, because we are afraid/ uncertain of (the lack of) scrutiny in time.



TABLE 5, Medicine

What are the positive aspects of this development?

Development of better health conditions/improvement of the quality of life (e.g. pathologies that are better treated/addressed and medicine that promotes comfort and productive capacity)

What are the negative aspects of this development?

- The risks of permanent personality/identity change
- The creation of relations of dependency
- Medicine can take liberty from people. The use for warfare purposes can allow the loss of human values and make soldiers more aggressive.

What kind of dilemmas will this development cause?

- What are the limits of informed consent? To what extent do people fully know the effects/consequences of drugs before taking them?
- The commercial control of certain drugs that are essential for the functioning of people.

Do the positive aspects outweigh the negative? Or vice versa?

The way of development is the better way.

Are you concerned that this kind of research/development is carried out?

No.

TABLE 6, Medicine

What are the positive aspects of this development?

- Not testing drugs on animal or people
- Technology supports the research on body diseases or problems
- Patient follow up (case study) and side-effect identification

What are the negative aspects of this development?

- Anaesthetise people/soldiers to create super-humans. What is the limit for the possible benefits?
- Long-term side-effects and the life quality deterioration.
- Destroy the social movements of protest or resistance to prevent upheavals (social apathy).

What kind of dilemmas will this development cause?

- Access to these drugs (social inequality)
- What are the limits of the benefits of improving the human body?

Do the positive aspects outweigh the negative? Or vice versa?

- It is positive if these drugs improve people's lives.
- It is negative if this technology is used to anaesthetise soldiers.

Are you concerned that this kind of research/development is carried out?

- Yes, as this research can contribute to manipulation or destroying people's resistance (creating intentionally social apathy).
- Pharmaceutical industry interests (many people die from diseases for which we already have developed the cure).



TABLE 1, Artificial Intelligence

What are the positive aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • Frees human workers from routine work • Robots get never tired and have indeterminate patience (this is good for certain patients (e.g. autists, Alzheimer patients, demented patients, etc.) 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • Can be used to build robots that do work that is dangerous to humans (e.g. de-mining)
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What are the negative aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • Creates a lot of unemployment • Robots equipped with artificial intelligence can outperform human beings • Devaluation of the human being in general • Devaluation of the human being in the world of employment/ industries • Replacement of humans by robots or other forms of artificial intelligence (e.g. in the care of sick or elderly persons, customer care in shops), the true (human) emotional component is missing 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • Robots or other forms of artificial intelligence can become "monsters" • The human emotional, empathic, and benevolent control of decisions and acts is annihilated • Intelligent weapons can end up in "wrong hands" (terrorists, dictators, etc.) • Intelligent weapons can decide alone on the execution of attacks/ killing actions/ war actions (or terrorism) without any influence or interference by the human being (fast, uncontrolled and autonomous computer decisions) • The machine (e.g. weapon) may have no "limits" - the human being always has limits
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What kind of dilemmas will this development cause?

<ul style="list-style-type: none"> • Ethical dilemmas will appear, e.g. how to ensure respect for human rights – which are concerned here (e.g. children's rights to an emotionally healthy growth, but in the future, they can be supervised by baby-sitter-robots) • The algorithms decide on the actions and reactions of intelligent machines (civilian use) or robot soldiers/intelligent weapons (military use); who guarantees that the algorithms are adequate or have any ethical component? • Our society is not prepared to handle these technologies – how to deal responsibly with them? • What should be the criteria for regulation and legislation? • To what extent human beings will be able to control the machines? The dilemma is to know/decide where to stop this research/ development • I do not see great dilemmas, because human intelligence will always be more powerful than artificial intelligence.

Do the positive aspects outweigh the negative? Or vice versa?

<p>For now, the positive aspects still outweigh the negative aspects, because the human beings are still able to control the machines.</p>
--

Are you concerned that this kind of research/development is carried out?

<ul style="list-style-type: none"> • Yes! Because perhaps intelligent machines will be able to master mankind. • Yes! Artificial intelligence can be faster than humans in their reactions, hence humans lose influence, control, and the power to make the last decision. • Yes! Machines can learn alone and overrule man. • Yes! Machines can learn autonomously (neuronal-style self-learning) other things than the programmer intended. • No! Because nothing "changes" the human brain (emotions, feelings, etc.). The human brain also cannot be replaced by anything. The human being is not replaceable and will always remain "ahead" of machines.
--



TABLE 2, Artificial Intelligence

What are the positive aspects of this development?

- Gain of efficiency
- Decrease the loss of lives
- Greater predictability and accuracy
- More rapid decision-making
- More rapid analysis
- Storage capacity of different scenarios
- Lower production costs for companies
- Decision support tool

What are the negative aspects of this development?

- Unaccountability
- Fewer jobs
- Loss of privacy
- More information leaks
- Greater social problems (inequality)
- Withdrawal of decision-making power from human beings

What kind of dilemmas will this development cause?

- How far will we go in letting the machines decide?
- What is the limit? Who controls whom?
- The answers/advise (or decisions) that Artificial Intelligence will provide can be followed uncritically by human beings.

Do the positive aspects outweigh the negative? Or vice versa?

- Currently, the positives outweigh the negatives, but we can have a change of scenery depending on the developments and their use/application.
- The negative aspects may be less, but their impact is so great that they are very worrying.

Are you concerned that this kind of research/development is carried out?

- Yes, we are concerned, especially in the long-term.
- (Yes, about the) gain of importance of machines and consequent loss of importance of man.



TABLE 3, Artificial Intelligence

What are the positive aspects of this development?

- Better health
- More efficient transportation + improvement of transport safety
- Reduction of working time
- Amplify human capabilities ¹
- Intercommunication ²
- ^{1 and 2} leading to faster and more efficient and autonomous processes

What are the negative aspects of this development?

- The machine decisions are of limited value as they depend only on algorithms
- Transfer of power from human beings to the machines
- Social and human loss of autonomy (reduction of employment)

What kind of dilemmas will this development cause?

- Absence of emotions/ values/ culture/ ethics
- The machine does not deal with indecision – killing/ not killing; yes/ no
- Inevitability of progression

Do the positive aspects outweigh the negative? Or vice versa?

- The positive aspects outweigh the negative
- We do not know

Are you concerned that this kind of research/development is carried out?

- In situations where different scenarios are possible, what does the machine choose? What will be the consequences?
- Who is the "owner"/ manipulator of the machine?
- Non-exclusion
- Whether the machine exceeds the range of actions for which it was programmed.

TABLE 4, Artificial Intelligence

What are the positive aspects of this development?

- Releases the human being from heavy tasks, or work in general;
- Higher reliability compared to human work;
- Ability to process Big Data;
- Autonomous decision capacity;
- Improves the objectivity of communication and human productivity.

What are the negative aspects of this development?

- Loss of control of the level of A.I. – at some point, an A.I. can conclude that the human being is the element to eliminate;
- Dehumanization processes;
- Mass unemployment;
- Incentive to counterfeiting;
- The level of objectivity – being completely inflexible and inhuman (e.g. denying access to services, not being able to use an A.I. vehicle in an emergency (e.g. escaping danger at high speed);
- Psychological effects on human civilization due to exclusion.

What kind of dilemmas will this development cause?

- Humanity might become superfluous or an element to decimate;
- How to balance the relationship of power between man and machine (with A.I.);
- Imbalance among nations (the rich can develop a lot of research while the poor have less possibilities to develop and access research);
- How to control the various purposes of research in this area?

Do the positive aspects outweigh the negative? Or vice versa?

- The negative aspects outweigh the positive because the current economic and social logic is one of competition and exclusion rather than inclusion;
- The positive aspects outweigh the negative because, currently, there are still no great negative aspects and we still can decide/change/influence the future of the processes.

Are you concerned that this kind of research/development is carried out?

Yes, because the negative effects can be very serious and it's difficult to scrutinize the research that is being done.



TABLE 5, Artificial Intelligence

What are the positive aspects of this development?

- Speeding up of the technological development
- Monitoring of vital and health data (AI can manage so much information and allow early detection of pathologies)
- There are no more sacrifices of human lives in situations of war

What are the negative aspects of this development?

- The machines may not be as reliable as the human being (risk of malfunctions)
- Risk of relying on machines for essential situations
- Losing control over machines ("Terminator doomsday")

What kind of dilemmas will this development cause?

- Can AI promote the loss of freedom of expression?
- The use of the acquired information can secretly be used to create riots/ revolutions/ destitution of governments → to influence citizenship
- Desensitisation can potentiate the risk of more quickly "create a war"
- Risk of dehumanisation

Do the positive aspects outweigh the negative? Or vice versa?

The positive aspects slightly outweigh the negative. However, there are too many questions/doubts.

Are you concerned that this kind of research/development is carried out?

It raises concerns. However, we believe that one should invest in development.

TABLE 6, Artificial Intelligence

What are the positive aspects of this development?

- New conclusions, more accurate data analysis, discovery of patterns
- New applications that support better life quality. In other words, the substitution of heavy duty works with AI (e.g. vacuum cleaners)

What are the negative aspects of this development?

- Loss of the decision-making capacity and other human skills (e.g. practical math knowledge)
- Surveillance and control (supported by Big Data and marketing)

What kind of dilemmas will this development cause?

- Data security and protection (where is data (in a server/in the cloud) and how is it protected?)
- Which regulation does apply?
- The smarter the computer the dumber the people.

Do the positive aspects outweigh the negative? Or vice versa?

- Positive aspects that outweigh the negative – more decision-making capacity/speed
- Negative aspects that outweigh the positive – “revolt of the machines”

Are you concerned that this kind of research/development is carried out?

- Surveillance and control by efficiently using Big Data
- Lack of transparency and literacy



TABLE 1, Brain-computer interfaces

What are the positive aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • Fabulous for the disabled! Fascinating (e.g. lost legs and arms prostheses, exoskeletons) • Virtual sex will be possible! • With the help of brain-computer interfaces people can feel and experience themselves close to one another while physically distant • Increased affectivity caused by augmented human senses 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • Good for war victims
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What are the negative aspects of this development?

<p>Civilian applications</p> <ul style="list-style-type: none"> • Virtual sex will be possible! • Loss of affectivity 	<p>Political, security, intelligence or military applications</p> <ul style="list-style-type: none"> • Abuse of reactions of people through control by the "outside" (e.g. soldiers with a chip in the brain who are in the field, controlled by the generals who are in the barracks). • Can be used to destroy the human being and mankind as a whole • Invasive interfaces: people may not know that they were subject of interventions (i.e. they may not be aware of the fact that they were "used" for objectives they do not know). The influence can be "hidden", e.g. nanochips that are breathed in or that are mixed in the food, surgical interventions under a pretext.
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What kind of dilemmas will this development cause?

<ul style="list-style-type: none"> • The "virtualization" of society (e.g. influence on the lives of the children of the future – they will communicate only virtually and no longer meet physically) • Loss of the human empathic capacity in cyborgs • What happens to the free will of the human being, and to the processes of decision making by the human being? • Military applications: there are "good" applications and "bad" applications; there are always two sides. Everything depends on the use ¹ <p>¹ Note: participants insisted to insert this here as well as in the question below</p>

Do the positive aspects outweigh the negative? Or vice versa?

<ul style="list-style-type: none"> • Yes, for now the positive aspects outweigh the negative. Especially in civil applications, this is clear and there is no doubt. In military applications, we cannot be sure about this, because we do not receive sufficient and transparent information. However also here there is potential for the positive aspects still outweighing the negative aspects (at least in democratic countries) • Military applications: There are "good" applications and "bad" applications; there are always two sides. Everything depends on the use ¹ <p>¹ Note: participants insisted to insert this here as well as in the question below</p>

Are you concerned that this kind of research/development is carried out?

<ul style="list-style-type: none"> • No! Because this is going to be the future, without any doubt! • Yes – on a military level; no - on the civilian level. • Yes! The future generation seems doomed to live without emotion.
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**TABLE 2, Brain-computer interfaces**

What are the positive aspects of this development?

- Treatment of diseases and physical limitations
- Changing the learning process which leads to increase the speed and relation between different types of information
- Ability to acquire information and data to prevent crime and terrorism
- Increased autonomy (e.g. disabled persons)
- Real-time disease monitoring

What are the negative aspects of this development?

- Conditioned privacy (access to private information, emotions, etc.)
- Conditioned free will
- Difficulty of accessing specific information without invading privacy

What kind of dilemmas will this development cause?

- Who decides, who has access and to what?
- Ethics – e. g. accessing the minds of patients in a vegetative state without their consent

Do the positive aspects outweigh the negative? Or vice versa?

- In the extra and intracorporeal non-mental part, yes.
- In the part related to the mind, clearly not.

Are you concerned that this kind of research/development is carried out?

- Yes, especially at the mental level.
- Yes, given the negative aspects mentioned and the future application of this development/research.

TABLE 3, Brain-computer interfaces

What are the positive aspects of this development?

- Total control of our body
- Direct relation brain-internet
- Electronic telepathy
- Amplify our capabilities
- Intelligence of clothes, etc.

What are the negative aspects of this development?

- Total control of our body
- Direct relation brain-internet
- Electronic telepathy
- Ability to empty "my" thought
- Loss of privacy (invasion)
- Loss of human autonomy
- Increased individualism/ decrease of human relations
- Manipulation of identities and masses

What kind of dilemmas will this development cause?

- In the vegetative state, I do not delegate to anyone the ability to decide for me
- Opportunity for access to all (technology and information)

Do the positive aspects outweigh the negative? Or vice versa?

- Negatives are a threat – they outweigh the positive aspects.
- There is a greater risk of take-over from "my brain"

Are you concerned that this kind of research/development is carried out?

Yes, because it can be misused.

TABLE 4, Brain-computer interfaces

What are the positive aspects of this development?

- Amplify the human capacity to interact physically and intellectually with the environment;
- Use in medicine – increased quality and life expectancy;
- Another channel of access to the brain potential;
- Access to “lost” memories through the computer.

What are the negative aspects of this development?

- Non-consensual or voluntary access to information in the brain;
- Control of computer interfaces by malicious entities;
- Loss of autonomy of human capacities – use the machine instead the body itself;
- Psychological impacts in the brain resulting from the access;
- Loss of feelings;
- Loss of the sense of identity of each of us as individuals;
- Nervous system overload;
- Use of related abilities for crime;
- The computer leads the brain to commit a crime.

What kind of dilemmas will this development cause?

- How to balance the development of these technologies?
- How to ensure the democratization of access to related technologies?

Do the positive aspects outweigh the negative? Or vice versa?

- Yes (in general), because it opens possibilities for treatment of diseases and increases the human capacity, overcoming the possible negative effects;
- Yes, the positive aspects exceed the negative in non-invasive applications, but not in invasive applications. We apply here a notion of risk and the precautionary principle;
- Don't know/do not want to answer – we have no notion of the menu of negative effects that may result from the investigation.

Are you concerned that this kind of research/development is carried out?

- It worries us when it is not scrutinized
- There is a concern about the lack of ethical principles in the processes
- It raises concerns about the loss of human emotions and feelings



TABLE 5, Brain-computer interfaces

What are the positive aspects of this development?

- Improvement of health (monitoring/prevention/treatment...)
- Promotion/enhancement of the human potential to go beyond biological possibilities
- The increase of individual and collective safety

What are the negative aspects of this development?

- Loss of motor control (mind/body)
- What are the ethical limits of invasion of privacy with these technologies?
- How to limit the risks of loss of identity/one's will?
- How this development can limit access to information.
- Potential for aggressive commercialisation of technologies

What kind of dilemmas will this development cause?

- To what extent these technologies and their positive potential can prevent manipulation and control of the consequences (individual and collective)
- How can States/interface managers promote defence and sovereignty without affecting the invasion of privacy?

Do the positive aspects outweigh the negative? Or vice versa?

Positive aspects outweigh the negative.

Are you concerned that this kind of research/development is carried out?

Yes:

- If it is used for destructive military purposes
- How it can influence/potentiate loss of privacy/identity
- Who controls the systems (monitoring)?
- What are the defences against hacking these systems (security/sovereignty)
- Hardware reliability

TABLE 6, Brain-computer interfaces

What are the positive aspects of this development?

- Improve the quality of life of people with neurologic/mental and physical problems.
- Knowledge diffusion and “multiplayer effect” (interface + platform)
- Improve the potentialities of the common human being

What are the negative aspects of this development?

- It can be used by people with wrong intentions
- Sects can take advantage of common people
- The interpretation that one can achieve by “reading minds” can be very limited and not mirror the real thoughts
- It can be sold as a good thing but it might turn out that it’s a fraud

What kind of dilemmas will this development cause?

- Who controls whom? – The man controls the machine or is it the machine that controls the man?
- Who is responsible when something goes wrong?
- Regulation
- To what extent is this perspective of improving the human being beneficial?

Do the positive aspects outweigh the negative? Or vice versa?

- Super-Human – the loss of identity (negative surpasses positive)
- Bigger economic and social inequality (richer people benefit more than poor ones)
- Loss of privacy/ intrusion, loss of free will and control

Are you concerned that this kind of research/development is carried out?

- Technologically no, but ethically yes.
- Yes (technology is not separated of ethics). Although, ethics cannot block everything.

Annex 8.3 – Translated templates from round 3

TABLE 1, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Access and application of the results for all (open!) - this is a part of the human rights	<p>What is the position of politicians looking at the need to advance science in health affairs? How can advances in the brain / computer interface reach people with less purchasing power? How do we ensure that the least developed countries will benefit from all these advances? How will policy makers improve the health conditions of poor countries? 4</p>	<p>What precautions are in place during the investigation so that the results are really possible to be applied in everyday life? What precautions will be implemented during the research to guarantee that the results will find their application in everyday life? 4</p>	<p>What will pharmaceutical companies do to improve poor countries' conditions? What will policy makers do? How can the problems of social and economic misery be solved? 1</p>	
Ethics	<p>Civil society / military / scientific education must grow in mutual tune How to create a common code of ethics between so-called democratic countries? 6</p>	<p>Civil society / military / scientific education must grow in mutual tune How to create a common code of ethics between so-called democratic countries?</p>	<p>How the recruitment of work force will be carried out while guaranteeing to respect the individual and privacy? 5</p>	<p>How to defend Human Rights with respect to the advances in artificial intelligence? What will be the roles of citizens, policy makers and stakeholders? 8</p>
Use for good	<p>How can we guarantee that the research on the human brain is used for the benefit of the human being and not the other way around? 10</p>	<p>Will the human being become more independent with technology? What are the effects of this independence? 1</p>	<p>Information about scientific results? Civil society is the objective not the increasing of economic power! How to prevent Artificial Intelligence from overruling human intentions? Or the human evolution's intentions! 1</p>	
How to control the use in isolated / dictatorial / undemocratic countries?	<p>How to control the military use of drugs, AI and brain-computer interface in countries like China or North Korea? How to keep the technological advance away from the hands of terrorists and non-democratic societies that do not defend human rights? 2</p>	<p>How should a human being act, that has no access to culture?</p>		
Transversal research	<p>Who participates in research projects? 2</p>	<p>Who participates in research projects? What professions can be created without the need for technology? 1</p>	<p>Who participates in research projects?</p>	<p>Who participates in research projects?</p>
Socio-economic effects	<p>What to do with the threat that workplaces are substituted by AI, increasing unemployment? What should be required of the specialized workers in the companies? 7</p>			<p>How to make provisions against the loss of contact coming along with the virtualization of societies? 2</p>

TABLE 2, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Clarification Request about the HBP	<p>What care will be taken in disclosing sensitive results?</p> <p>What initiatives do you intend to promote to deepen the follow-up of the project and the citizen's debate?</p> <p>How will you monitor the limits of the research processes and the use of the results?</p>	<p>What care will be taken in disclosing sensitive results?</p> <p>How do you intend to disseminate the studies to the general public in order to promote their understanding and debate?</p> <p>Who will have access to this information?</p> <p>Ethical limits of research.</p> <p>What are the objectives of this research / project?</p> <p>What limits were previously admitted by the study?</p> <p>How do you want to safeguard your application?</p> <p>What is the possibility of introducing changes in the project?</p> <p>How do you plan to ensure the project's IT security?</p> <p style="text-align: right;">3</p>	<p>How will the dissemination of pharmacological production costs pass on to the consumer?</p>	<p>Require complete, correct and transparent information from the project managers.</p> <p style="text-align: right;">5</p>
Concerns about dual use	<p>What are the limits that the State imposes to the double use?</p> <p>Will there be a global coordination and sharing of relevant information from different projects?</p> <p>Who decides what is ethically correct or not regarding the use of this information?</p> <p>How do these projects jeopardize the security of citizens?</p> <p>How do these projects bring benefits to society?</p> <p>What care will be taken in disclosing sensitive results?</p> <p style="text-align: right;">12</p>	<p>How do these projects jeopardize the security of citizens?</p> <p>How do these projects bring benefits to society?</p> <p>What care will be taken in disclosing sensitive results?</p> <p>How will you position yourself if you make a major scientific breakthrough that may have increased risks of misuse?</p> <p>What are your motivations? What drives you to the lab every day? Are you worried about the possible misuse of your work?</p> <p>How do you intend to disseminate the studies to the general public in order to promote their understanding and debate?</p> <p style="text-align: right;">6</p>	<p>Role of different industries in financing future developments.</p> <p>Does your economic activity have other goals besides maintaining activity and profit?</p> <p style="text-align: right;">1</p>	<p>What do citizens think about brain research?</p> <p>Require complete, correct and transparent information from the project managers.</p> <p style="text-align: right;">2</p>
Education and Citizen Participation	<p>Does the education system advocate the development of critical thinking on these issues?</p> <p>What educational policies exist or can be implemented to create critical awareness about these issues?</p> <p style="text-align: right;">5</p>		<p><i>Participants that were not working at this table considered the topic to be very interesting and important to raise issues about it also to stakeholders.</i></p> <p style="text-align: right;">3</p>	<p><i>Participants that were not working at this table considered the topic to be very interesting and important to raise issues about it also to citizens.</i></p> <p style="text-align: right;">1</p>
Process and Product Monitoring	<p>What are the mechanisms to control the use of the project results?</p> <p>How will the use of this information by third parties be regulated?</p> <p>How will the budget execution of the project be controlled? Are you planning to advertise it?</p> <p style="text-align: right;">14</p>	<p>How will stakeholder's conflicts of interest be controlled?</p> <p>Will partial information be disclosed or will the final results of the project be conveyed?</p> <p style="text-align: right;">1</p>	<p>Role of different industries in financing future developments.</p> <p>Does your economic activity have other goals besides maintaining activity and profit?</p>	<p>Who do you think should be held responsible for the effects / results of scientific research in front of the general public?</p> <p style="text-align: right;">1</p>

TABLE 3, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Regulation	How to produce adequate, preventive legislation? Politicians decide the advancement of this technology in several phases of research 4	Decision on use of information: civil, military / national defence, security How and for what purposes would all the research carried out/ obtained information be forwarded? 4	Decision on use of information: civil, military / national defence, security	Decision on use of information: civil, military / national defence, security
Power and control	Who holds the power/ control over AI, interfaces and drugs (who controls them and how?) Is there a consensus regarding the process of automation and robotization of everyday life? 5	Who holds the power/ control over AI, interfaces and drugs (who controls them and how?) Is there a consensus regarding the process of automation and robotization of everyday life? 2	Who holds the power/ control over AI, interfaces and drugs (who controls them and how?) Is there a consensus of the process of automation and robotization of everyday life? 3	Who holds the power/ control over AI, interfaces and drugs (who controls them and how?) Is there a consensus of the process of automation and robotization of everyday life? 1
Accessibility (information, results, materials, process, dissemination)	How will policy makers premeditate the access to information and decision-making in matters that directly involve the people they represent? What about accessibility to the research? Disaster relief organizations in natural disasters should have access to this technology Democratization, equity (inclusion vs. exclusion), access to drugs and devices 11	Democratization, equity (inclusion vs. exclusion), access to drugs and devices What about accessibility to the research? 1	Democratization, equity (inclusion vs. exclusion), access to drugs and devices What about accessibility to the research? 1	Democratization, equity (inclusion vs. exclusion), access to drugs and devices What about accessibility to the research? How to guarantee access and democratization to the media? (involve information, material and results) 5
Ethics	Definition of ethics/ values associated with research and use of information	Definition of ethics/ values associated with research and use of information How to guarantee the impartiality and confidentiality of results? Ethics and decision-making power – how to inculcate values in the machine (AI) 10	Definition of ethics/ values associated with research and use of information 1	Definition of ethics/ values associated with research and use of information
Rights	Individual right to identity, privacy, decision (especially in vegetative cases)	Individual right to identity, privacy, decision (especially in vegetative cases)	Individual right to identity, privacy, decision (especially in vegetative cases) 1	Individual right to identity, privacy, decision (especially in vegetative cases) Acceptance - how these possibilities are accepted or not Citizens should use safe technologies only and realize the effects of the same 4
Funding	Would the division of funding be made equally by the various areas (health, military force, etc.)? 2	Would the division of funding be made equally by the various areas (health, military force, etc.)? Civil versus military funding	Would the division of funding be made equally by the various areas (health, military force, etc.)? How to ensure fair funding with guaranteed efficient results (stakeholder's laboratories) 2	Would the division of funding be made equally by the various areas (health, military force, etc.)?

TABLE 4, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Security	How to prevent A.I., pharmaceuticals and interfaces from being used for crime and war 7			
Education / Learning	Teaching in school should not disestablish handwriting and head calculations; Debate the use of neurosciences in teaching and learning (adults as well as children)	Teaching in school should not disestablish handwriting and head calculations; Debate the use of neurosciences in teaching and learning (adults as well as children)	Teaching in school should not disestablish handwriting and head calculations; Debate the use of neurosciences in teaching and learning (adults as well as children) 1	
Focus on the A.I.	How to ensure the formation of an ethical committee for monitoring advances in A.I.; How to control the progress of the A.I. 10	Slowdown of the inventive processes so as not to lose breath; How do we ensure that A.I. use for military purposes does not control or annihilate us? How do we stop a machine with A.I. from killing innocent or from having a bug and killing indiscriminately? 1	Slowdown of the inventive processes so as not to lose breath; How do we ensure that A.I. use for military purposes does not control or annihilate us? How do we stop a machine with A.I. from killing innocent or from having a bug and killing indiscriminately? 1	
Monitoring of research processes	How to control / scrutinize the participation of private entities with commercial interests in research in this area? How to prevent large multinationals from using drugs, A.I. and interfaces to influence and control human behaviour? How do we ensure that drugs are not used for mental control of the population? How to make sure that interfaces do not gain their own will, against us? 2	Development of a new ethics related to A.I.; How to inscribe ethics and goodwill in the fundamental composition in the constitution of A.I.? Debate the creation of ethical entities (commissions, associations), state = regulation of research is necessary; necessity of creating robust instruments of monitoring and scrutiny of R&D in this area (by regulators and/or ethics committees); Need to create regulations for the use of the products of this R&D (innovation) 2	How to control/ scrutinize the participation of private entities with commercial interests in research in this area? How to prevent large multinationals from using drugs, A.I. and interfaces to influence and control human behaviour? How do we ensure that drugs are not used for mental control of the population? How to make sure that interfaces do not gain their own will, against us? 4	How to put limits to the political/ economic/ military use by institutions with malicious intentions? How to ensure the ethical/ moral integrity of the programs/ games (brain-computer interfaces) to which people will submit themselves without great scrutiny? How to make sure that interfaces do not gain their own will, against us? 14
Disclosure / Communication	How to communicate with the public (in general) about the advances and aspects (negative/ positive) of the computer brain interfaces? How to guarantee the dissemination of the produced knowledge?	How to communicate with the public (in general) about the advances and aspects (negative/ positive) of the computer brain interfaces? How to guarantee the dissemination of the produced knowledge? 3	How to communicate with the public (in general) about the advances and aspects (negative/ positive) of the computer brain interfaces? How to guarantee the dissemination of the produced knowledge?	How to communicate with the public (in general) about the advances and aspects (negative/ positive) of the computer brain interfaces? How to guarantee the dissemination of the produced knowledge?
Democratization	How to ensure social and economic inclusion in access to drugs with potential for rapid diagnosis of mental illness? And the democratization of the use of products? How to guarantee generalized access to the advances? How to not reveal an early diagnosis of a disease to the patient? 9	How to ensure social and economic inclusion in access to drugs with potential for rapid diagnosis of mental illness? And the democratization of the use of products? How to guarantee generalized access to the advances? How to not reveal an early diagnosis of a disease to the patient?	How to ensure social and economic inclusion in access to drugs with potential for rapid diagnosis of mental illness? And the democratization of the use of products? How to guarantee generalized access to the advances? How to not reveal an early diagnosis of a disease to the patient?	How to ensure social and economic inclusion in access to drugs with potential for rapid diagnosis of mental illness? And the democratization of the use of products? How to guarantee generalized access to the advances? How to not reveal an early diagnosis of a disease to the patient?

TABLE 5, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Legislation/ Regulation	<p>Medicine: what restrictions and regulations will be imposed on pharmaceutical industries for them not to manipulate both the market and users?</p> <p>Can politicians guarantee the well-being of their citizens by controlling the technology, in a way that does not interfere too much with the life of each person?</p> <p>Address the non-invasion, everyone should be able to live his own individuality.</p> <p>Security of society, importance of laws, political leadership. 7</p>	<p>What means should be created to ensure that human beings and humanity in general are not abused.</p> <p>Ethics: to what extent can we rely on the ethics of the human being? Do we (civil society) trust in the ethics of scientists, that they will not cooperate for military purposes? 10</p>		
Future?	<p>What constraints and challenges are posed to the evolution of the human species? (given climate change and the autonomy of technology) 1</p>		<p>How to respond to: a) sustainability and technology, b) environment, c) climate 2</p>	<p>What constraints and challenges are posed to the evolution of the human species? (given climate change and the autonomy of technology)</p> <p>Parallel lives: a) men, b) machine/robot, c) living in another planet 4</p>
Ethics		<p>How can researchers continue their investigations without violating the rights of common citizens, and - instead - work for the common good?</p> <p>Civil rights/ robot rights: limits and challenges 2</p>	<p>Raise awareness in a way that decisions are not made only based on money (monetary) 1</p>	<p>Make each person aware of themselves and of the world in which they are living. 2</p>
Liaison/ Coordination	<p>How to articulate institutional partnerships/ scientific advances 3</p>			
Safety	<p>Research and dual use - invasive/ improper access: a set of laws should be established that safeguard the security of individual privacy. How will it be defined? 2</p>	<p>Artificial Intelligence: How will AI be monitored and controlled? 8</p>	<p>Brain-computer interfaces: ensure that no stakeholder can misuse technology (e.g. consumer manipulation, influencing opinions). How do we guarantee this? 7</p>	<p>Brain-computer interfaces: what information would citizens be willing to reveal or put at risk. How can a citizen defend himself against "attacks" with drugs that harm his health, but make the pharmaceutical industry rich? 8</p>

TABLE 6, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Human development vs. “Super-Human” development	How far is it beneficial to increase human potentialities? 13	How far is it beneficial to increase human potentialities? 2	How far is it beneficial to increase human potentialities?	How far is it beneficial to increase human potentialities?
Information sharing and dissemination	How to ensure access to information (for everybody)? What is already being done and what impacts does it have or had (public unawareness)? 13	How to ensure access to information (for everybody)? What is already being done and what impacts does it have or had (public unawareness)? 2	How to ensure access to information (for everybody)? What is already being done and what impacts does it have or had (public unawareness)?	How to ensure access to information (for everybody)? What is already being done and what impacts does it have or had (public unawareness)? 1
Economic benefits	Economic benefits to companies (allowed income, financing, results’ presentation) 1		Economic benefits to companies (allowed income, financing, results’ presentation)	
Social benefits	Who benefits from the results of this research? (main and secondary beneficiaries) 8	Who benefits from the results of this research? (main and secondary beneficiaries)	Who benefits from the results of this research? (main and secondary beneficiaries)	Who benefits from the results of this research? (main and secondary beneficiaries) 1
Self-regulation	Supervision - policy-makers: does legislation and a regulatory entity already exist for these studies? If yes, how to improve and adapt these studies? / researchers: funding vs. legislation What about regulation? “Self-regulation” = collaborative and transparent effort (“ethics committee”/ “pilot committee for research”/ “Block Chain”) Who promotes, who leads (from the 4 “categories” of stakeholders), who “decides”, who “controls” (benchmarking)? 11	Supervision - policy-makers: Does legislation and a regulatory entity already exist for these studies? If yes, how to improve and adapt these studies? / researchers: funding vs. legislation What about regulation? 3	Supervision - policy-makers: Does legislation and a regulatory entity already exist for these studies? If yes, how to improve and adapt these studies? / researchers: funding vs. legislation 1	Supervision - policy-makers: Does legislation and a regulatory entity already exist for these studies? If yes, how to improve and adapt these studies? / researchers: funding vs. legislation



Annex 8.4 – Results from morning survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

(mark the answers that you agree with the most with an X)

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (choose one option)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
1	5	7	9	7

- 2) If publicly funded research has dual use potential, should it then be allowed? (choose one option)

a. Yes	13
b. No	6
c. I don't know/do not wish to answer	10

- 3) As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? (choose one option)

a. Yes, the most important thing is to make progress in the research.	5
b. Yes, but only if it is based in another EU member state.	1
c. Yes, but only if it is based in an allied country of the European Union	0
d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons	17
e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.	5
f. I don't know/do not wish to answer	3

Note: One of the participants chose more than one option (b, d and e), therefore the total is higher than the number of participants (29).

- 4) The European Commission has a big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? (choose one option)

a. Yes	19
b. No	3
c. I don't know/do not wish to answer	6



Annex 8.5 – Results from afternoon survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

(mark the answers that you agree with the most with an X)

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? (choose one option)

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
1	7	7	5	8

Note: One of the participants forgot to provide an answer to this question

- 2) If publicly funded research has dual use potential, should it then be allowed? (choose one option)

- a. Yes
- b. No
- c. I don't know/do not wish to answer

19
5
5

- 3) As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? (choose one option)

- a. Yes, the most important thing is to make progress in the research.
- b. Yes, but only if it is based in another EU member state.
- c. Yes, but only if it is based in an allied country of the European Union
- d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons
- e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.
- f. I don't know/do not wish to answer

9
1
1
14
6
1

Note: One of the participants chose more than one option (b, c, d and e), therefore the total is higher than the number of participants (29).

- 4) The European Commission has a big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? (choose one option)

- a. Yes
- b. No
- c. I don't know/do not wish to answer

23
5
1



Annex 9: Country Report - Slovakia



Human Brain Project

Citizens' View on Neuroscience and Dual Use

[Slovakia]

Authors/Compiled by: Tomas Michalek



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Summary of results

Overall, there was a variety of attitudes towards the discussed topics ranging from positive approach to the development to the negative one. There was also a frequent opinion that whatever is going on the regular people cannot influence it. And all of these attitudes were represented at all the discussion tables.

The main concern across the themes was the loss of humanity (if technology prevails). As related to the central topic, the participants highlighted mostly a need to respect human nature and individual right to self-determination. In other words – not to be dependent on any – be it for any great benefit – technology.

The participants were as well concerned about the threat of manipulation of emotions and thoughts of ordinary citizens (for future use of brain research) either because of abuse or hacking of the "system". They spontaneously reflected a general feeling of being manipulated (with the silent agreement of the state), mainly by the financial sector (to take loans), by pharmaceutical industry via medical doctors who push them to take specific medicines, by media (to buy goods).

The big concern was mistrust of state power and its integrity in terms of control over the exploitation of the results (some people mentioned the period of the former Prime Minister Vladimír Mečiar when the ruling party abused the state to strengthen its power and intimidate citizens). Most frequent, spontaneous direction of discourse at the tables concerned a general distrust to authorities and to spending public money for private profit (not exclusively for scientific-research purposes). There were concerns expressed in particular about the misuse of research results for "evil" and immoral purposes (e.g. international conflicts).

On the other hand, the participants displayed a significant decrease in individual agency, an inclination to paternalistic values. And a generally low trust in their own capacity to influence public issues. They focused especially on the comparison of past and present, as it was difficult for them to imagine the future.



Results from Round 1 – Research and Dual Use - Overall principles

In discussions, the participants agreed that the cooperation is needed to avoid stagnation. The results should be public, people familiar with them and they should not be used against the people. Generally, the majority of participants expressed trust in specialized institutions (Ministries of Interior, Education, Defence, Slovak Academy of Sciences, Universities, Hospitals, etc.). They believe in a research which shifts the development of "human race" to the better; therefore it is not important who finances it.

It is not a fundamental problem to bring together the means of civil and military research. Even though it means a cooperation between military powers. For Europe, a collaboration is desirable because the United States has a top-level research. Europe should not lag behind the US or China. From the Slovak perspective, we should support the common EU approach. Slovakia is a small country so it can afford only low funding for civil and military research and it must rely on the EU and NATO respectively.

Some participants said that everything can be misused. Secret services can get to any information. And the public research will anyhow end up in the hands of the army as that is where the biggest profits are made (look e.g. at the situation in the United States). It cannot be avoided but you have to be prepared for that. And it is ok if it is to help fight the terrorism. The public scrutiny is needed (means, efficiency). It is necessary to find the limits of exploitation and abuse. There are concerns about misuse by other organizations and state powers. Moreover, there is an ongoing blurring the lines between the military and commercial use. The army becomes business (states and corporations), PC games will become a real war. Quite controversially, there is also a possibility of abuse of army research by the public (drones).

On the other side of the spectrum, some participants do not like the combination of military and civilian resources. They saw it as a conflict of interest. When a research started as civilian, it should not become military at the later stages. Opposite to the first group of the participants, these participants are against any cooperation in this regards, because the others could benefit from it. Funding should be separate; military and civilian research should not be funded together. The military research should not be a priority. The priority should be given to the medical research.

There was also a group of nihilists who said that we do not know what we're actually discussing. There should be no military purposes. What if the findings are misused against humanity? Further development of military and intelligence technologies is unnecessary. The military destructive potential is already sufficient. "They" care only about the money (for research).

Results from Round 2 – Three areas of research

Medicine

The participants discussed mostly about the positive aspects. There was basically no concern about progress in medicine. There are high expectation for human health. People will be more confident about their chances to fully recover from diseases (exoskeletons for people paralyzed after stroke, restored vision and hearing, accelerated treatment of cancer, robotic limbs, increased IQ etc.). Among the benefits there are also more targeted treatments, development of diagnostic tools, improved quality of life (less stress), prolongation of life and also spared resources.

The participants expressed concerns especially related to ethics: exploitation of results, side effects, the relationship of faith and research. They feared particularly the loss of identity and improvements of human body. People will be also eager to take more risks and abuse things. There are also risks of computer failures and software errors. Does not a human become a robot which is controlled by others?

The participants saw negatives in side effects of new drugs and, surprisingly, in prolonged human life which can lead to overpopulation. A long life needs more funding. Moreover, pharmaceutical companies, social and health insurance companies do not want people to definitely cure or prolong their lives for financial and business reasons. In medicine, it's mostly about money. Financial interests dominate research motivation. Medicine is a business. Progress is financed only for progress.

There is also a question what will be the price of new technologies and drugs, especially concerning the fact that all people should have an equal access to them. This is combined with insufficient education. People have poor / bad / no information about new possibilities.

Artificial intelligence (computer learning)

Artificial intelligence would be beneficial for many if it can be used under circumstances not suitable for human beings, e.g. firefighting (the higher price of human who is irreplaceable). So it would mean a more comfortable and safer life, simplification of work (production / factory), better data availability and reduction of car accidents due to human error (autonomous cars). Quantitative data analysis could be used for better predictions in medicine, meteorology and applications to normal life. "Technology is our toy, which brings us joy and fascinates us." Participants were not afraid of any manipulation if they have their own sense of judgement. They were neither afraid to share information about them.

However, there are some concerns. The machine can only do what a person has programmed into it. When it is necessary to discard the human / emotional element and create a machine independence, this moral dilemma of who is programming it becomes more important. There are questions about a responsibility for actions: human factor versus machine. Participants do not want to give the right to artificial intelligence to replace man. It should help people, not replace it. If the people will be unemployed, who will contribute to the state budget? We are not thinking about the consequences all the time – we have options, but who has the responsibility? Programmer, machine, company, owner?



We should not allow complete autonomy of the machines. The robot must not exceed the man. Moral dilemmas are related to possible misuse in the military field. The robots should not control us. Nevertheless, they cause us stress and discomfort and they can break down. We should not be dependent on the machine as they may fail. There is a need to resolve incompatibilities of different HW and SW systems. Moreover, there are concerns about protection of personal information and data leaks (hacker attack).

The negative aspect is that computers could learn “the bad things” from people. And that simplified life could negatively affect health conditions of people – see e.g. loss of emotion, loss of human contact and changed relationships. Some participants said that we are now experiencing a negative boom of technologies (consumption, misinformation, manipulation, etc.). What will people do and how will they live? Will we have control over artificial intelligence? What will happen to love? How will be the interpersonal relationships? What values will dominate? What emotions will exist? They say that the smarter the computers are, the more stupid the people will be – we will not need to learn anymore. We may lose our humanity – our children are already living in the virtual world.

Brain-computer interfaces

The health point of view was predominant, especially a potential to help people who are somehow disabled so they can walk again, control their limbs or hear again. The participants also discussed about simulations to better prepare people for different situations or occupations (education). Brain-computer interfaces could improve information processing and shorten the “idea to product” process. We will not learn unnecessary, but only quality information.

The participants expressed concerns about using chips in the brain. What if the connection does harm the brain? There are also moral concerns about this will be tested on humans and animals. Will we become robots? Virtual reality should be used only for a limited time to avoid negative influences (aggression, loss of identity, privacy loss, cyber-bullying, hacking, electromagnetic frequencies etc.). They were afraid if we will not learn anything new, we will worsen our memory so, at the end, the improvement will not be worthwhile. Plus, will the machine know what I want? Will there be a 100% transmission of information? Do we want machines and technology to think for us? Are we becoming only passive users?

It is necessary to take decision on “acceptable limits” – to define the boundaries of identity: what is a person who is a robot. Questions of synchronicity between human and machine. The fear that technology will control the brain. Moreover, there is a dilemma to whom and how to make these “upgrading” technologies available. Negative would be if they are unavailable to ordinary people. A dilemma is whether another humanization of computers is desirable. A question of the influence on decision-making processes concerning people control and behaviour manipulation. A dilemma of marketing versus impact on people. There are concerns about the loss of free thinking. Getting information about ideas can be good for one side and bad for another.



Cross-cutting

During thematic rounds, information on examples of research use was a clue for the participants. The examples mentioned by the moderator were used in the discussion more than the not mentioned ones (but were in the manual). Only a few participants were able to imagine other uses, for example for brain-computer interfaces. For others, the subject was distant and brought only few ideas or ideas to the discussion.

The area that was thematically the easiest to grasp and the participants returned to it was medicine. In cases of brain and medical research, participants were more likely to trust in a professional institution, to cooperate with foreign countries, and not to misuse the results. In the case of artificial intelligence and brain-to-computer interfaces, greater scepticism has emerged, and the purpose of such innovations has often been questioned, or even totally rejected.

The biggest problem was that the questions were many times formulated so that the participants did not know what they were supposed to mean, and then the discussions were harder to start. The discussion was more extensive and fluid when we talked about artificial intelligence and medicine, probably because these areas were better understood by participants and were more specific and closer to them than the other discussed topics. The most important question was whether such research is needed and to whom its results will serve.

There seems to be a tendency to underestimate the negative effects. Positive promotion prevents us from seeing a negative. Positives prevail (we believe in them). We cannot imagine the possible consequences. If we do not try, we will not know. We have to try it, but the possibilities of abuse are huge and unimaginable (especially a loss of privacy). We also feel a loss of the certainty of the world we know – we have to remember numbers, the information is focused on technology, which we do not understand and do not learn them. Left alone risks of non-regulated geopolitical development (social inequalities, power politics, etc.).

Results from Round 3 – Questions to address in the future

1. Is it ethical to communicate with a person in a coma and to obtain information from the brain after death?

Theme: n/a; **Actors:** citizens; **Number of votes:** 23

2. Is it always a human first?

Theme: n/a; **Actors:** policy-makers; **Number of votes:** 16

3. How to solve a financial issue so e.g. robotic limbs will be available to ordinary people?

Theme: n/a; **Actors:** policy-makers; **Number of votes:** 15

4. How is information secured against hackers?

Theme: n/a; **Actors:** businesses; **Number of votes:** 15

5. Are these surveys and consultation designed for the general public (for citizens) or for economic purposes only?

Theme: n/a; **Actors:** policy-makers; **Number of votes:** 14

6. Will people / public be informed about the results of HBP? About drugs, inventions, products?

Theme: n/a; **Actors:** policy-makers; **Number of votes:** 14

7. How can we prevent abuse of research funding?

Theme: n/a; **Actors:** researchers; **Number of votes:** 13

8. How to guarantee non-use of medicines for military purposes?

Theme: n/a; **Actors:** policy-makers; **Number of votes:** 13

9. Will artificial intelligence help people in the future?

Theme: n/a; **Actors:** citizens; **Number of votes:** 13

10. Robot or human? What can I do if I want to remain a free person with my feelings not influenced by computers?

Theme: n/a; **Actors:** researchers; **Number of votes:** 10

10. Can you identify safety risks?



Theme: n/a; **Actors:** researchers; **Number of votes:** 10

10. Who decides about the use of technology? Is it for all or for those who need it?

Theme: n/a; **Actors:** policy-makers, researchers, stakeholders, and citizens; **Number of votes:** 10

10. Are we ready for the future?

Theme: n/a; **Actors:** stakeholders, businesses, churches, and citizens; **Number of votes:** 10

The questions reflected nicely the discussions we had at the tables. Many of them are about “human first” and ethical aspects of introducing these kind of technologies. They want to remain humans with free thinking. Also, concerns about privacy and data protection were very important for the participants. On the other hand, there are very practical questions about what the artificial intelligence is good for and who is really needing it. And also the ones about financial aspects and funding of new technologies and innovations. The participants were also interested in knowing who decides about the future and if the stakeholders, business, church and citizens are ready for what will come. They felt that they do not have enough information.



Key themes across rounds

Overall, the topic of neuroscience and dual use was difficult to grasp for participants and rather complicated. In the first round, they seemed to have expressed their opinion almost on everything that was relevant to them and what they felt they understood. In other (themed) rounds, their attitude was repeated, and sometimes they came to re-express what was already said.

The participants were welcoming the new technologies which can potentially come up out of the brain research. They discussed a lot about positive aspects this could bring. On the other hand, a fear of so-called dehumanization and loss of free mind were the most significant concerns. On the practical side, they were concerned about how funding and accessibility of the research results will be done. Some participants were concerned about the current issues of research funding in Slovakia specifically that our government was unable to fully secure EU funds for research. This fact influenced discussions on different topics and caused that the participants were expressing their scepticism more often.

During the debate there were many concerns-related opinions that could be described as conspiratorial, too:

- Pharmaceutical companies are only pursuing business and not producing effective medicines so they can keep high incomes.
- In medicine, it is all about chemistry and natural treatments are ignored.
- A cancer medicine must definitely exist, but the researchers have not published it because they want to draw on the funds for keep doing cancer research.
- Is the fight against terrorism a real one? Or is it just an excuse for business?
- "Someone is playing with us and big money is being spent."
- "They already control us."

The participants were very much concerned with not being informed properly about research and its possible consequences. They feel being seduced by the nice things (with their "eyes glued") but, in fact, they are not given the proper information. The reason for it, as they see it, can be partly described as a set of individual failures of the authorities in terms of publication of information and suitable regulations.

Demographic profile of participating citizens

Concerning age distribution of the participants, it has to be noted that the Statistical Office of the Slovak Republic (SOSR) uses different age categories when compared to the one used by the project. Anyhow, the participants reflected the general population in Slovakia very well with the only exception of the people 65+. Moreover, there was a light overrepresentation of the groups 18-29 and 50-59 (when using the project age categories).

Gender was represented equally.

In terms of education, there is also a difference in the indicators as the SOSR uses only four levels of education. Given that, we have a very good representation of all three education levels (primary and lower secondary, higher secondary and university level).

As for geographical zone, again, the SOSR uses different indicators than city-town-rural characteristics. The available data relies on the number of inhabitants. Nevertheless, here, also the participants reflected pretty well the population in Slovakia.

Data on the participating citizens:

Age:	Participants confirmed for the workshop	Participants showed up for the workshop	Age (SOSR ⁶):	Participants showed up for the workshop (SOSR)	Percentage of the age group compared to the general population
18-29:	8	8 (24%)	18-24	7 (21%)	18-24: 12,35%
30-39:	8	6 (18%)	25-34	5 (15%)	25-34: 20,58%
40-49:	8	7 (21%)	35-44	8 (24%)	35-44: 18,03%
50-59:	11	11 (33%)	45-54	7 (21%)	45-54: 17,39%
60-69:	1	1 (3%)	55-64	6 (18%)	55-64: 16,00%
>70:	0	0	65+	0	65+: 15,65%

⁶ Statistical Office of the Slovak Republic (SOSR) uses different age groups distribution. <https://slovak.statistics.sk>

Gender:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the gender group compared to the general population
Women:	18	17	52%
Men:	18	16	48%
Other:	0	0	N/A

Education	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
Primary and lower secondary education:	13	12	44,67%
General upper secondary education :	13	13	37,67%
Vocational Education and Training:	N/A	N/A	N/A
Bachelor or equivalent:	N/A	N/A	N/A
Masters or equivalent:	10	8	17,65%
Doctoral degree or higher:	N/A	N/A	N/A

Geographical zone (percentage of population living in...):	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
City (20,000+):	18	15	40%
Town(2,000-20,000):	8	8	30%
Rural (0-2,000):	10	10	30%

Annex 9.1 – Translated templates from round 1

TABLE 1, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- Certainly, they should be linked and used.
- Yes, but under certain conditions, it depends on what purpose (protection, abuse, threats).
- It should be civil and military separated because they have different goals, priority, and focus.
- Military research does not publish data.
- If possible - release from public research only some of the data.
- We need to consider where the results can help and where to abuse.
- It's good when it can profit from military research.
- Good when it's easier to work
- Treatment of civilization diseases - Alzheimer's disease.

Do you find it problematic or reassuring? Please explain (why/why not).

- Problem if data (personal) gets to other organizations.
- Use / abuse in war conflict.
- Ok, if it makes peoples work easier.
- When it's connected, it can be better used.
- The military area may misuse some results.
- It's not okay for everyone to share their research.
- Okay, if they have a common goal, they will save themselves, they will clearly say what to use and what not.
- Put emphasis on research into incurable diseases.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Whether or not there will be war.
- The fact that research has already had the results of treatment, but it does not release them because of pharmaceutical business.
- Public opinion and behaviour of the entire population may be affected.
- Use of secret weapons.
- Hygienic weapons.
- Concern about the use of chemicals instead of natural ones.
- That robots will change us, technology will dominate, less social contact.
- Common communication is lost, people are becoming artificial.
- People will not work, the robots will (people do different things – they do not know it, they do not have the content).

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- It is abuse (as in the United States, martial law) – other states are under the threat of terrorism.
- It's okay if it's to protect people.
- No, in the case of Slovakia, because it would be misused (as with Prime Minister Mečiar) if there are more developed countries.
- Maybe they do not need more information about people (us), but they should focus more on the research of terrorism.
- It is not a bad way to find out how this behaviour is taking place, to know how it is in Islam, how terrorism affect us.
- The fear that the army will only "play" with it and it will not help us.

TABLE 1, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- In the EU we do not have the same standard.
- In Slovakia there is a problem with the use of financial resources (drawing on structural funds).

Please explain why/why not.

- They should work together, they are skilled people, they get better results when they get together, and there is more money.
- It's a fact – the countries are cooperating, it should be like that and we will not change much.
- Collaboration, finance, visibility of Slovakia and our results.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- It is necessary to separate the military and civilian sectors.
- It can if the countries commit themselves to use results for the defence of the population.

Please explain why/why not.

- It is important to control the flows of money and to go for the right purpose.
- Determine the purpose of using the results at the citizen level such as civil control.

TABLE 2, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- They will be used anyway, the military area will use it as a priority.
- I do not care, they have nothing to do, and if they want to use it in the army, they will use it.
- I would be worried if the terrorists used it, but on the other hand it could be used as a defence.
- Can be used for both good and bad. It can be used and misused.
- It depends on whoever gets it - or misuses.

Do you find it problematic or reassuring? Please explain (why/why not).

- If the Allied Army OK.
- If in the hands of Islam, abuse.
- If a foreign army or terrorists get this, then our army also needs to have these technologies for defence.
- Important control within the army and research to prevent it from being misused.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Not to abuse it against the ordinary people.
- Not to start the war.
- In order not to reach the black market, into the hands of terrorists.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- If only the defence, OK, but who will guarantee that.
- If it's used to defend, it's okay.
- While it is in defence, a powerful politician can abuse it if he has power ambitions and knows that other armies do not have it.

TABLE 2, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- Collaboration is good, more knowledge can be developed.
- In the event of a serious threat from a potential aggressor, cooperation is not good (e.g. Russia, USA).

Please explain why/why not.

- “More heads, more sense”.
- The advantage of cooperation gets both sides – the aggressor, but also the defender.
- It is not possible to prevent possible abuse, but it is also beneficial to cooperate.
- We need to choose who we will work with, based on the size of the army.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- In Slovakia yes, because we are not aggressors - it also applies to the whole of Europe.
- If something is created and it remains secret, it is unnecessarily devised, and if it is disclosed, a potential abuser will also get it.

Please explain why/why not.

- Yes, if we join with the army, a greater chance of higher resources, research can be intensified, expanded, accelerated.
- Nonsense discussion, because research is public, and the results are still coming to the army.
- At present the internet cannot hide the results, everyone gets it (if it is public research).
- It must be financially supported, regardless of the fact that it can be misused, because this cannot be avoided.

TABLE 3, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- Yes, for the defence. It's a duty. Secret services and defence are relevant. - Public / Army control. - Delay in military and public research (other objectives) and funding.
- Slovakia - a small country, little funding for military research, it has to be funded by powers. - Financing in Slovakia prioritises public interest in the EU / NATO context evenly.
- Confidence in research - transparency.

Do you find it problematic or reassuring? Please explain (why/why not).

- It's easy to use for unknown purposes.
- Scratching the borders of military and commercial use - PC games will become a real war.
- The army becomes business (states and corporations).
- When it comes to informing the public: "They would glue their eyes" by nice things but in reality???

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Individual failures (publication of information, regulations). State power abuses. Public scrutiny is needed (means, efficiency).
- We do not know which side we are - Russia vs. USA. We are part the EU. Misuse of army research by the public (drones).
- Ethics of dehumanization / influencing the psyche.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- Not army, but rather secret services will use it. Is the fight against terrorism a real one? Or a business?

**TABLE 3, Template 2**

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- From the international side, cooperation, mutual assistance, humanitarian, quid pro quo – something for something – under peace treaties. Confidence in professional institutions (MV, MŠ, MO, SAS, Universities, hospitals).

Please explain why/why not.

- Moral duty to cooperate. No - human rights.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- Yes, if it meets ethical and peace goals.

Please explain why/why not.

- N/a.

TABLE 4, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- Of course it should not be used for military purposes. But it could be. The feeling that we cannot influence it as citizens.

Do you find it problematic or reassuring? Please explain (why/why not).

- It's not okay. It would not be announced in advance which is a problem.
- Research needs to be publicized and people familiar with it.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- The soldiers would be remotely controlled, one would not be able to intervene in it, stop it and restrict it - if it a brain is controlled.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- Not because terrorism is unambiguous. If it was possible to influence the thinking of terrorists, yes. It does not change anything.

**TABLE 4, Template 2**

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- If it was only in one country, there could be stagnation and isolation as if we were going from scratch.
- It is good to cooperate, but it is necessary to determine the objectives for which research will be used

Please explain why/why not.

- They could cooperate as far as the state institutions are concerned, not the private sector.
- To determine the rules in advance so as not to be misused.
- Collaborate and consult things if the boundaries of research are precisely defined.
- If more people work together, there may be more results.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- Yes, they can negotiate.
- No, they cannot, because it should be separated.

Please explain why/why not.

- Yes: if they have the same opinions and a project. If it was published, people were informed and had access to it.
- No: not to abuse.



TABLE 5, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- It should not be allowed for military purposes.
- It should be possible to use it.
- Yes, but with conditions and control of use.
- The question is nonsensical, secret services get to everything.

Do you find it problematic or reassuring? Please explain (why/why not).

- We do not know what we're talking about.
- There should be no "military purposes".

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- What if the findings are abused against humanity.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- It's a very abstract question.... If so, such research should be specifically targeted.



TABLE 5, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American "Brain Initiative" or the Chinese "China Brain Project"?

- Influencing the activity of soldiers through the brain is unlikely.
- Collaboration is desirable because the US has top-level research.

Please explain why/why not.

- I do not like a combination of military and civilian resources.
- If the army wants to use it, let it be financially involved.
- Yes, cooperation, so that Europe is not lagging behind the US and China where they work together.
- I feel as if someone's been playing with us - big money is poured.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- It's okay, everything can be abused...
- Research that shifts the development of "human race" to better, it is not important who finances it.

Please explain why/why not.

- Further development of military and intelligence technologies is unnecessary. The military destructive potential is sufficient. "They" care only about money (for research).
- Brain research is not a priority. Investing in medicine, human protection, and healthy nutrition.

TABLE 6, Template 1

What do you think about the fact that public research intended for civilian use can be used by the military or intelligence agencies?

- There is money in the war, they will get the results of public research anyway.
- It cannot be avoided, you have to look forward to it, but do not try to avoid it.
- Associated with psychiatric research.
- The concern that it should not be misused. There should be co-operation if it is in the interests of good.
- It's ok but it should not get out (from the SR).

Do you find it problematic or reassuring? Please explain (why/why not).

- Find a border - what is exploitation, what is abuse (manipulation by psychic).
- If it is NASA, for example, it is all right, terrorists not.
- Even in war, they are not clearly good and evil, both sides may think they are good.

What, if anything, concerns you about the possible use of the research results by the military or intelligence agencies?

- Not to be misused for psychic manipulation. Radicalization. Getting and abusing power.

Does it make a difference if the use of the research by the military or Intelligence agencies is for defence or counter-terrorism purposes?

- It would help the citizens - then it would be okay.
- Research will not change anything. They would tell us it is a counter-terrorism, but it will be something else.

TABLE 6, Template 2

As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. It is in general an integrated part of research to collaborate with other researchers in the same field, or at least sharing knowledge and results, in order to move the field/research forward. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies, e.g. the American “Brain Initiative” or the Chinese “China Brain Project”?

- Those with military funding are at a higher level. If we isolate it, it will be a disadvantage. We need to work together.
- Conflict of interests, if we did start as a civilian research, we should not continue as military one.
- It should stay at home.

Please explain why/why not.

- We are a poor state - whatever we find out, the others would benefit more than us. We are not a rich country. If we do not cooperate with abroad, we would be behind in the knowledge and the financing - Isolation: Slovakia would be in jeopardy.
- When we close the gate, they cannot help us. We have to believe that it will be used for good purposes.

Can an organisation receive funding through the Human Brain Project for their civilian research, if they at the same time do military funded research?

- It does not matter if the organization is well-educated and capable. It should not, but it does not matter.
- Consensus opinions mostly.

Please explain why/why not.

- It depends on the abilities.
- Military research cannot be separated from civilian. Those who think that - it is a nonsense. Military research can be kept secret for at least a while.
- They are interconnected.

Annex 9.2 – Translated templates from round 2

TABLE 1, Medicine

What are the positive aspects of this development?

- Precisely targeted drugs. Development of a diagnostic program, an information system.
- Civilization diseases and their treatment. It would be important to explore the reduction of stress and disease. Explore the question of why people are sick - genetics research.
- Improved diagnostics will save time for doctors and finance.
- Improvement, simplification of life, comfort.
- Assistance to soldiers.
- Animal welfare.

What are the negative aspects of this development?

- The fear of drug abuse, side effects.
- Abuse by military forces against the population, to instigate conflict.
- It depends on who and the purpose of the research.
- The fear of too much chemistry.

What kind of dilemmas will this development cause?

- It is important that ethics still prevails.
- Protect research and results from misuse.
- Someone may have the problem of combining faith (e.g. soul) and brain research.
- Make results and products help more and harm less (side effects).
- Obey and have a code of ethics.

Do the positive aspects outweigh the negative? Or vice versa?

- Yes, especially because it can improve people's lives and cure diseases.

Are you concerned that this kind of research/development is carried out?

- Abuse of drugs, side effects, abuse of research results.

TABLE 2, Medicine

What are the positive aspects of this development?

- Assistance to people - new drugs - treatment of diseases not yet treated.
- The state is interested in people getting cured as soon as possible, because it costs a lot of money if they are sick.
- Sophisticated models can produce tailor-made medicine.
- Improvement in order to limit negative side effects.

What are the negative aspects of this development?

- Abuse - harm to people.
- Extending life increases the need for limited resources (food, housing, energy).
- Pharmaceutical companies are not interested in definitively curing diseases because they would not have business.
- Social and health insurance companies may not be interested in life-prolonging medicines because they would have to pay for their pensions and treatment for a long time. Even the state does not want to cure definitively, because then the economy will not grow.

What kind of dilemmas will this development cause?

- Permanent treatment vs. one-time treatment.
- Side effects - one thing is cured, another may be triggered.
- Each drug also has a negative side - research takes decades.
- Whether animal research is sufficiently transferable to humans.
- Everyone cannot live for a hundred years, because overpopulation.

Do the positive aspects outweigh the negative? Or vice versa?

- More positives, although side effects can be dangerous - more research needs to be taken into account.
- The local is positive (something quick to improve my illness, the close ones will live longer), but the global is negative, Africa - large population - nutrition issues - prolonging life even greater. The more people, the worse the ecology.

Are you concerned that this kind of research/development is carried out?

- They are not worried, especially to make life longer and better

TABLE 3, Medicine

What are the positive aspects of this development?

- Priorities: diagnosis, therapy, prevention (better preparation e.g. early diagnosis).
- Research of replacement organs (parts of the body, limbs), causality appearance, solution of civilization diseases, healthier life, prolongation of life, improvement of its quality.
- Remote diagnostics, top professionals (effective and quality treatments).
- Enhancement of human (Will we be still people?) - strength / cognition.

What are the negative aspects of this development?

- Medicine is business. - Progress only for progress.
- Progress to the detriment of quality? - Remote diagnostics.
- Influencing the psyche - consequences - uncertain / addictive.
- Cloning. - We do not want to wait / cannot.
- Poor education - People have poor / no / bad information about drugs.

What kind of dilemmas will this development cause?

- Will the public have access to new drugs and technology? The price - everyone has to be able to buy medicine.
- Life saving has a higher price - regardless of religion. Abuse of technology.

Do the positive aspects outweigh the negative? Or vice versa?

- More or less balanced - Pay-outs are more beneficial, but negatives should be tracked.
- To educate the public - the natural aspect of security (state / medicine).

Are you concerned that this kind of research/development is carried out?

- Loss of identity / human improvements.

TABLE 4, Medicine

What are the positive aspects of this development?

- The animals would cease to be used for research.
- Better diagnostics and appliances.
- Better development and efficacy of medicines.
- Increase productivity in study, work.
- Better lives of people with mental disorders.
- More precise use in microsurgery.
- Robotic body part replacement.

What are the negative aspects of this development?

- Medicines will be available for "any stupid thing" and people will use pills unnecessarily.
- The computer system that replaces the animals might not be accurate.
- Dependence could be created. Suppression of emotions in soldiers. Inhumanity.

What kind of dilemmas will this development cause?

- In the case of surgery, it would be better to let human operate because human is human, closer than machine.
- Moral abuse of soldiers, as well as people in general. Misinformation for soldiers - consequence of dependence.

Do the positive aspects outweigh the negative? Or vice versa?

- They are balanced, but it can always be misused.

Are you concerned that this kind of research/development is carried out?

- No worries, soldiers would be inhumane, toxic / drugs, fear of abuse.

TABLE 5, Medicine

What are the positive aspects of this development?

- High expectations for human health. Robotic limbs. Increasing IQ. No promises of mental benefits from brain research so far.

What are the negative aspects of this development?

- Risks of computer failure – software errors. Tools for controlling people.

What kind of dilemmas will this development cause?

- Does not a human become robot = controlled by others? Financial interests dominate the motivation of research.

Do the positive aspects outweigh the negative? Or vice versa?

- Effects are balanced.

Are you concerned that this kind of research/development is carried out?

- “They control us already.”

TABLE 6, Medicine

What are the positive aspects of this development?

- Finding a drug, technology. Improving quality of life, prolonging active life.
- Treatment of cancer, loss of vision, hearing, paralysis, acceleration of treatment.
- Social impact - enhancement of the environment, not only rapid cure, but e.g. that artificial intelligence could care for the sick.
- Technology will be more advanced and will better diagnose the symptoms - even faster.

What are the negative aspects of this development?

- Psychodrama drugs - they could be misused. Underestimation of adverse effects for the purpose of drug sales.
- We are not ready to prolong life.
- Use in the army - Soldier stimulation + technique.

What kind of dilemmas will this development cause?

- Even what seems immoral and unethical to us can bring valuable results (see World War II - Mengele).
- Availability of treatment / greater gamblers.
- Compassion, playing on the sentiment prevents us from seeing a negative.
- Technology vs. replacement of human factor.

Do the positive aspects outweigh the negative? Or vice versa?

- Positives prevail, one is more confident that he will receive treatment.

Are you concerned that this kind of research/development is carried out?

- The social aspects - are we ready to extend our life?
- Military purposes.

TABLE 1, Artificial Intelligence

What are the positive aspects of this development?

- Cars OK - For better security as a device, which highlights the human error.
- Better diagnostics in medicine.
- Can the robot report on human errors (diagnostics, science, weather forecasting, disaster prevention, flight dispatching)?
- Technology to help to make life safer.
- Use robots where there is a danger to humans or where human factors may fail.

What are the negative aspects of this development?

- Robots are not OK - they would replace us, they may fail, they cannot evaluate (diagnose) as a human.
- People will not have a job.
- Simplifying life brings a risk of health problems.
- Everything will be artificial, nature will be lost.
- Totally autonomous cars do not exist.

What kind of dilemmas will this development cause?

- To use the results correctly.
- Do not abuse in the military.
- Human has to be the supervisor over technology – to be the one who controls it.
- Not to place robots where it is important to keep a human factor (e.g. in medicine during surgery).
- Robots should help us - not replace us.

Do the positive aspects outweigh the negative? Or vice versa?

- In the civil sector, ok. Where people fail.
- Progress - these are more positives than negatives.
- People will change due to progress - perceived both as natural development and a fear.
- You do not have to rely too much on technology.
- It depends on progress, and the view of the robotics role can change.

Are you concerned that this kind of research/development is carried out?

- Robots will replace us and people will not be needed - to prevent the loss of humanity.
- Robots - bad assessment of the situation - badly programmed moral barriers and this is a risk to the military area (as well in education, work, free time, relationships).
- They can be hacked.



TABLE 2, Artificial Intelligence

What are the positive aspects of this development?

- Human assistance - if it focuses on a specific area, the error rate will be reduced.
- Knowing where the closest person is is a plus.
- Personalized ads are a plus (e.g., an offer of nearby restaurants).
- Quantum computers - much higher than today's computers - positives in many areas (medicine, space research).
- In the future, help with surgery can be solved.

What are the negative aspects of this development?

- Worried about spying. Quantum computers multiply negative effects (e.g. internet security vs hacking).
- Autonomous traffic - possibility of error, failure.
- If I am replaced with computer, I will not live anymore, the computer will. People are not talking to each other today - everybody is reading their cell phone.

What kind of dilemmas will this development cause?

- What will people do? How will they live? What will they live from?
- Whether a person always has control over the computer.
- Whether or not a few specialists control the rest of the world.
- What brings interaction between machines - collaboration vs. fight – Will people get involved in it?

Do the positive aspects outweigh the negative? Or vice versa?

- There are more positive aspects (time, energy, stress reduction, health, and diagnostics). A balanced match.

Are you concerned that this kind of research/development is carried out?

- No – We can always switch off the computer.
- Yes, if abused - the computer uprising against the people (Asimov - the necessity of rules to prevent it).
- The smartest the computers are, the more stupid people will be (they will not learn).
- We will lose humanity - children are already living in the virtual world.

TABLE 3, Artificial Intelligence

What are the positive aspects of this development?

- Dissemination of information / better data.
- Autonomous cars - Reduction of accidents due to human error.
- Simplification of work (production / factory), streamlining / improving quality of life.
- Technology is our toy, brings joy and fascinates us

What are the negative aspects of this development?

- Spreading misinformation. We rely on the technique and it can spoil us - it has got mistakes.
- Robots will replace us - employment. The robot must not exceed the man. Loss of emotion. Not thinking about the consequences - we have the options, but who has the responsibility? (Programmer, machine, company, owner?)

What kind of dilemmas will this development cause?

- Who and where will be financed - unemployment - who contributes to the budget?
- Who is responsible for? - Security in the hands of whom? Leaks / misuse.

Do the positive aspects outweigh the negative? Or vice versa?

- Positives prevail but cause us stress, spoil, loss of human contact, change of relationships.

Are you concerned that this kind of research/development is carried out?

- Data leaks (hacker attack). Personal information. Dependence on technology (which may fail). Occupation.
- Loss of the certainty of the world we know - we do not remember the numbers, the information is focused on technology, we do not understand / we do not learn them.

TABLE 4, Artificial Intelligence

What are the positive aspects of this development?

- Simplifying life. Better predictability. Better identification of the disease. Increased speed of work. Better anticipation, threat detection. Robotic operations - the best solution, the computer does not make an emotional decision. Shared information against terrorism.

What are the negative aspects of this development?

- Computer will take control of itself. People will be second. They know everything about us and they can easily get information. They take our privacy – marketing.

What kind of dilemmas will this development cause?

- Marketing bullying, we are being watched. Loss of privacy. Robots will take care of people, replace them.

Do the positive aspects outweigh the negative? Or vice versa?

- Positives will dominate - people perceive it as an improvement of life.

Are you concerned that this kind of research/development is carried out?

- There is always an idea of abuse against a person. Robots will replace humans at work. Computers would learn the bad from people.

TABLE 5, Artificial Intelligence

What are the positive aspects of this development?

- Helping people (not replace them). In transport. Assistance to the disabled.
- Troubleshooting the incompatibilities of different HW and SW systems.

What are the negative aspects of this development?

- What happens to love? What to interpersonal relationships? What values will dominate? What emotions will exist?

What kind of dilemmas will this development cause?

- What will people do then?

Do the positive aspects outweigh the negative? Or vice versa?

- No (?!). We are now experiencing a negative technology boom (consumption, manipulation ...).

Are you concerned that this kind of research/development is carried out?

- Yes - the robots will replace us.

TABLE 6, Artificial Intelligence

What are the positive aspects of this development?

- Use in extreme situations when it is about human life - fires, police interventions.
- Quantitative data analysis and prediction - medicine, meteorology.
- When it is necessary to discard human / emotional factor.

What are the negative aspects of this development?

- People can abuse it - theft, war. Army of machines. Dependence on machines. Use of cyber-crime.
- With any good purpose, a technology may fail.

What kind of dilemmas will this development cause?

- Who is responsible for the acts of artificial intelligence? Person or machine alone?
- How to increase the morale of people who program these machines? - Does artificial intelligence do what a person has programmed it to do? (Dependence on human factor).
- What will be the experience? How will they evaluate them?
- Do not give the right to artificial intelligence to replace people.

Do the positive aspects outweigh the negative? Or vice versa?

- 50/50 with the decisive role of human factor.

Are you concerned that this kind of research/development is carried out?

- The machines can programme themselves and behave as they want.
- Rise of machines - elimination of human factor as a risk.

TABLE 1, Brain-computer interfaces

What are the positive aspects of this development?

- Replacement of the limb.
- Improve the functioning of disabled people (such as Stephen Hawking).
- Use in the treatment of mental illness.
- Supporting organs, exoskeleton, carrying loads.
- Nanotechnology - Body repairing by mini robots.
- Improving learning - receiving, processing information.
- An application that warns you of heart attacks or other hazards (such as insulin dg, for example).

What are the negative aspects of this development?

- Ensure that the brain-computer interface does not hurt and is received by the body.
- It may happen that the body does not accept the interconnection (in medicine) and there are also other surgical procedures.
- Tests are carried out on animals. Risk of human testing - limit, increase safety.

What kind of dilemmas will this development cause?

- Be careful when being used (misused) by the army.
- Allow sick people to have paid for the "upgrades", not only those who have the money.
- The idea that brain-computer interfaces will not be permitted for healthy people.
- The benefit of wider use would be data and enhanced technology.

Do the positive aspects outweigh the negative? Or vice versa?

- The positives dominate.

Are you concerned that this kind of research/development is carried out?

- The fear that a computer connected to the brain will begin to control a person.
- Compatibility of the human brain and the computer must be solved.
- Concerns about new technologies being explored (on animals).

TABLE 2, Brain-computer interfaces

What are the positive aspects of this development?

- Progress in medicine (flaccid muscles, bionic limbs, rehabilitation, and diagnostics) and education.

What are the negative aspects of this development?

- The technical problem – to prevent something we do not want to happen (I will want to give someone a slap and my bionic limbs will do it even though I just wanted it to do it but not really do it).
- High price (for exoskeleton).
- Chaos - chips in the brain - we'll know about others what they think.

What kind of dilemmas will this development cause?

- Is the next humanization of computers wished? (Will not a computer take our girlfriends/boyfriends out instead of us? Will not a computer want to stay on medical leave while we have to work?)
- Where are the boundaries between the correct and incorrect brain-computer interface?

Do the positive aspects outweigh the negative? Or vice versa?

- Positive: Suppressing negative ideas, keeping important information.
- Negative: The ability to crash into people's ideas.

Are you concerned that this kind of research/development is carried out?

- No - progress will come gradually - people will adapt.
- Yes - chaos - the problem to explain.
- Such research is definitely already going on.

TABLE 3, Brain-computer interfaces

What are the positive aspects of this development?

- Healthcare - Handicapped - Movement, Diagnostics, Evaluation.
- Criminology - Detector of lies - revealing personalities (plus and minus).
- Improved brain function - information processing, better quality, but also aggression.
- Reducing the "idea - product" process.
- We will not learn unnecessary, but good things.
- Synchronicity human / pc.
- Better localization - technology is not a limited resource.

What are the negative aspects of this development?

- Cyber-bullying / influencing the brain.
- Negative health consequences (harmfulness, magnetism).
- Abuse (hacking / aggression).
- We will not learn anything (worsen memory) - Enhancement is not worth it.

What kind of dilemmas will this development cause?

- Will the machine know how I want it? 100% transmission? Do we want machines / technology to think for us? We will be users.

Do the positive aspects outweigh the negative? Or vice versa?

- Positives prevail (we believe in them). We cannot imagine the possible consequences.

Are you concerned that this kind of research/development is carried out?

- There is a need to go for it, but the possibilities of abuse are enormous and unimaginable.
- The internet of things / what is connected to what? Chipping / Restriction - Privacy Loss? We do not try, we do not know.

TABLE 4, Brain-computer interfaces

What are the positive aspects of this development?

- Civil use. Replacement of the limbs. Help with handicaps in ordinary life (blindness, deafness). Communicating with people who are affected. People's backward thoughts, communicating with people in coma, and so on. Computer simulations - pilots and the like (doctors). Connecting two people using a computer (their brains).

What are the negative aspects of this development?

- Reading people minds. Finance - accessibility for a wide range of people

What kind of dilemmas will this development cause?

- People will not be able to express themselves.

Do the positive aspects outweigh the negative? Or vice versa?

- Positive impressions, education and help for people.

Are you concerned that this kind of research/development is carried out?

- Controlling people's ideas.

TABLE 5, Brain-computer interfaces

What are the positive aspects of this development?

- Values: health +, social relations -, tolerance +.

What are the negative aspects of this development?

- Reading peoples mind (horror?).

What kind of dilemmas will this development cause?

- Risks of geopolitical development (not regulated, social inequalities, power politics).
- It is necessary to institutionalize the decision on "acceptable borders".
- Define the boundaries of identity: what is a person, a robot.

Do the positive aspects outweigh the negative? Or vice versa?

- No (?)

Are you concerned that this kind of research/development is carried out?

- N/a

TABLE 6, Brain-computer interfaces

What are the positive aspects of this development?

- Nerve revival, walking, hearing. Virtual reality - possibility of simulation of activities (e.g. soldiers). Brain training - memory, attention (plus learning). Fun function - computer games without remotes.

What are the negative aspects of this development?

- We're becoming more like robots. Chip in the head - getting information about that person's ideas. Loss of personality identity. Restriction of freedom. Manipulation of behaviour. Reaction of the link to thinking (e.g. damping). Gaming business

What kind of dilemmas will this development cause?

- To use the machines in moral way. Who manipulates and who is manipulated? Permanence vs. possibility to disconnect. Marketing vs. impact on people.

Do the positive aspects outweigh the negative? Or vice versa?

- Negatives dominate - in terms of freedom and dignity. Positive is just medical help. Positive if used for doing good things.

Are you concerned that this kind of research/development is carried out?

- Loss of free thinking. Manipulation of behaviour. Persecution. Governments could do that to the people.

Annex 9.3 – Translated templates from round 3

TABLE 1, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	Why did not our politicians use the EU money properly for scientific purposes? 7	How to avoid computers taking over humans? 7	*(For businesses) How is information secured against hackers? 15	
	When will our lifestyle improve? 6	Do you think it is a right approach to use brain research in the army where it can be misused? 7		
	When you had the opportunity to use funding from the European Funds why did not you do it properly? 2	Why is there no cure for cancer? 5 Whether it is possible to determine patient health by linking the brain to the computer? 4		
	Why are politicians so selfish and terrible? Why do not they use money for research?	Can we expect a cure for cancer in the near future? But such a cure that cures completely and not just stops or stabilizes the disease? 3		
		Will the funds be used for brain research only? 1		
		Where will we be in 20 years? 1		

TABLE 2, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	Are these surveys and consultation designed for the general public (for citizens) or for economic purposes only? 14	Are these surveys and consultation designed for the general public (for citizens) or for economic purposes only? 14		Will artificial intelligence help people in the future? 13
	How about the access to army research? 6	How can we prevent abuse of research funding? 13		Whether is it absolutely necessary to have everything computer-controlled? 5
	Would you finance the project in medicine or in education? 3	Will there be advances in medicine if the brain is connected with a computer? 1		
	How will we manage money when robots will perform many of our current jobs? 2	To what extent and with what biotechnology should the humanization of machines and / or robotization of humans occur? 1		

TABLE 3, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	Will people / public be informed about the results of HBP? About drugs, inventions, products? 14	Can you identify safety risks? 10		
	Who will control the safety and consequences of such a (brain-computer) link? 6	Are there some limits for human-centred research not to be abused? 8		
	What about a better funding for international research? And better dissemination to the public? 4	Should people be afraid of robots? 6		
	Should people be afraid of keeping their jobs? What will they do? 4	Are not humans forgotten in the research? Do not you think about improving that? 5		
	What kind of money is the research fundet from? Our public or private? 2 Who really decides on priorities? How can everyone participate? 1	Who really decides on priorities? How can everyone participate? 1		
	How do insurance companies and businesses participate financially?			

TABLE 4, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	How to solve a financial issue so e.g. robotic limbs will be available to ordinary people? 15		(Church): Would the church agree with brain-computer interface? 3	Is it ethical to communicate with a person in a come and to obtain information from the brain after death? 23
	How to guarantee non-use of medicines for military purposes? 13			
	How to deal with the current topic of terrorism? 8			

TABLE 5, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	Is it always a human first? 16	Robot or human? What can I do if I want to remain a free person with my feelings not influenced by computers? 10	What about contacts with extra-terrestrial civilizations and opening of debate in this field? 6	
	Will you prevent compulsory brain-chips? 9	How can you prevent abuse of reading minds? 7	Who will sell drugs? How will the pharmaceutical companies make profit when they will not have medical representatives who will not “pay” doctors and pharmacists?	
	Will unemployment increase when computers will work for us? 2	How should be the computer connected to our brains? 3		
	Do you plan to allocate more funds? 1	Do you think about whether all these advances will hurt people more than they will help them? 3		
		Will humanity be always at the first place? 1		
		Can you give people more information?		

TABLE 6, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	Who decides about the use of technology? Is it for all or for those who need it?*	Who decides about the use of technology? Is it for all or for those who need it?*	Who decides about the use of technology? Is it for all or for those who need it?*	Who decides about the use of technology? Is it for all or for those who need it?*
	10	10	10	10
	Is there enough production resources?	Who will be responsible for failures?	(Businesses, churches): Are we ready for the future?	Are we ready for the future?
	4	9	10	10
	Are these now technologies a way to improve our lives or a way to gain more power and money by the chosen people?	(Are these now technologies a way to improve our lives or a way to gain more power and money by the chosen people?)	(Are these now technologies a way to improve our lives or a way to gain more power and money by the chosen people?)	(Are these now technologies a way to improve our lives or a way to gain more power and money by the chosen people?)
	6	6	6	6
	Do you know how to design social system to guarantee quality of people's life when we will liv longer (pensions, care, etc.)?	(Do you know how to design social system to guarantee quality of people's life when we will liv longer (pensions, care, etc.)?)	(Do you know how to design social system to guarantee quality of people's life when we will liv longer (pensions, care, etc.)?)	(Do you know how to design social system to guarantee quality of people's life when we will liv longer (pensions, care, etc.)?)
	6	6	6	6
	Do you address security, personality, social aspects and freedoms?	(Do you address security, personality, social aspects and freedoms?)	(Do you address security, personality, social aspects and freedoms?)	(Do you address security, personality, social aspects and freedoms?)
	4	4	4	4
	Is not it profitable only for a certain big group of people?	(Is not it profitable only for a certain big group of people?)	(Is not it profitable only for a certain big group of people?)	(Is not it profitable only for a certain big group of people?)
	4	4	4	4
	Against whom does everyone want to fight?	(Against whom does everyone want to fight?)	(Against whom does everyone want to fight?)	(Against whom does everyone want to fight?)
	4	4	4	4
	Do you think it is necessary for our life?	(Do you think it is necessary for our life?)	(Do you think it is necessary for our life?)	(Do you think it is necessary for our life?)
	3	3	3	3
	Who is actually the right person or institution that decides on our (human) future direction? Is it government? Scientists? The army?	Who is actually the right person or institution that decides on our (human) future direction? Is it government? Scientists? The army?	Who is actually the right person or institution that decides on our (human) future direction? Is it government? Scientists? The army?	Who is actually the right person or institution that decides on our (human) future direction? Is it government? Scientists? The army?
	2	2	2	2

Annex 9.4 – Results from morning survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? *(choose one option)*

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
13	10	6	3	0

- 2) If publicly funded research has dual use potential, should it then be allowed? *(choose one option)*

a. Yes	17
b. No	5
c. I don't know/do not wish to answer	11

- 3) As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? *(choose one option)*

a. Yes, the most important thing is to make progress in the research.	13
b. Yes, but only if it is based in another EU member state.	1
c. Yes, but only if it is based in an allied country of the European Union	2
d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons	8
e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.	6
f. I don't know/do not wish to answer	3

- 4) The European Commission has a big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? *(choose one option)*

a. Yes	14
b. No	10
c. I don't know/do not wish to answer	9

Annex 9.5 – Results from afternoon survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

- 1) Does it make you concerned that the research from the Human Brain Project could be used by others for political, security, intelligence and military purposes? *(choose one option)*

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
5	16	8	4	0

- 2) If publicly funded research has dual use potential, should it then be allowed? *(choose one option)*

a. Yes	21
b. No	8
c. I don't know/do not wish to answer	4

- 3) As a European funded project, we are not allowed to do military research. However, other research initiatives on the human brain may be funded by defence agencies. Should the project collaborate with other brain research initiatives or organisations that work for or receive financial support from defence agencies e.g. the American "Brain Initiative" or the Chinese "China Brain Project"? *(choose one option)*

a. Yes, the most important thing is to make progress in the research.	14
b. Yes, but only if it is based in another EU member state.	1
c. Yes, but only if it is based in an allied country of the European Union	1
d. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons	13
e. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.	3
f. I don't know/do not wish to answer	1

Note: One of the participants chose more than one option (b, c, d and e), therefore the total is higher than the number of participants (29).

- 4) The European Commission has a big focus on open science, where research data and analyses are public for everyone. Should this also be the case with research that could have dual use potential? *(choose one option)*

a. Yes	12
b. No	13
c. I don't know/do not wish to answer	8