Human Brain Project

Citizens' view on neuroscience and dual use

[Portugal]

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Content

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 extend 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 arouse 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.

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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.

Annex 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?

- 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.

Annex 2 – Translated templates from round 2

TABLE 1, Medicine

What are the positive aspects of this development?

Civilian applications	Political, security, intelligence or military applications
• 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	• It can help soldiers (or war victims) to cope with post-traumatic stress experiences (e.g. war)

What are the negative aspects of this development?

Civilian applications	Political, security, intelligence or military applications
• 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	• 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)

What kind of dilemmas will this development cause?

- 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?

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

- 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.

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

- 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?

Civilian applications	Political, security, intelligence or military applications
• 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	• Anxiety control • Production of antidotes for chemical and biological weapons

What are the negative aspects of this development?

Civilian applications	Political, security, intelligence or military applications
• That it does not consider each one's individuality • Environmental contamination • Drug production, leading to increased crime	• Dehumanization of military apparatus • Disapearence of own will • Individual unaccountability • Production of chemical and biological weapons • Drug production

What kind of dilemmas will this development cause?

- Ethical dilemmas
- Coercive use
- Limits of use
- Who decides? (use and application)
- Pressure for use to increase productivity

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

This question is difficult to evaluate in abstract.

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

- 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 he 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?

Civilian applications	Political, security, intelligence or military applications
• 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.)	• Can be used to build robots that do work that is dangerous to humans (e.g. de-mining)

What are the negative aspects of this development?

Civilian applications	Political, security, intelligence or military applications
• 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	• 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

What kind of dilemmas will this development cause?

- 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?

For now, the positive aspects still outweigh the negative aspects, because the human beings are still able to control the machines.

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

- 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 overweigh 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?

Civilian applications	Political, security, intelligence or military applications
• 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	• Good for war victims

What are the negative aspects of this development?

Civilian applications	Political, security, intelligence or military applications
• Virtual sex will be possible! • Loss of affectivity	• 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.

What kind of dilemmas will this development cause?

- 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]

[1] **Note:** participants insisted to insert this here as well as in the question below

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

- 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]

[1] **Note:** participants insisted to insert this here as well as in the question below

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

- 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.

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 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	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	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	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	
Ethics	Civil society / military / scientific education must grow in mutual tune How to create a common code of ethics between so-called democratic countries? 6	Civil society / military / scientific education must grow in mutual tune How to create a common code of ethics between so-called democratic countries?	How the recruitment of work force will be carried out while guaranteeing to respect the individual and privacy? 5	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
Use for good	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	Will the human being become more independent with technology? What are the effects of this independence? 1	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	
How to control the use in isolated / dictatorial / undemocratic countries?	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	How should a human being act, that has no access to culture?		
Transversal research	Who participates in research projects? 2	Who participates in research projects? What professions can be created without the need for technology? 1	Who participates in research projects?	Who participates in research projects?

2

Socio-economic effects	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?			How to make provisions against the loss of contact coming along with the virtualization of societies?

TABLE 2, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Clarification Request about the HBP	What care will be taken in disclosing sensitive results? What initiatives do you intend to promote to deepen the follow-up of the project and the citizen's debate? How will you monitor the limits of the research processes and the use of the results?	What care will be taken in disclosing sensitive results? How do you intend to disseminate the studies to the general public in order to promote their understanding and debate? Who will have access to this information? Ethical limits of research. What are the objectives of this research / project? What limits were previously admitted by the study? How do you want to safeguard your application? What is the possibility of introducing changes in the project? How do you plan to ensure the project's IT security? 3	How will the dissemination of pharmacological production costs pass on to the consumer?	Require complete, correct and transparent information from the project managers. 5
Concerns about dual use	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? 12 5	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? How will you position yourself if you make a major scientific breakthrough that may have increased ri of misuse? What are your motivations? What drives you to the lab every day? Are you worried about the possible misuse of your work? How do you intend to disseminate the studies to the general public in order to promote their understanding and debate? 6	Role of different industries in financing future developme Does your economic activity have other goals besides maintaining activity and profit? 1 3	What do citizens think about brain research? Require complete, correct and transparent information from the project managers. 2 1
Education and Citizen Participation	Does the education system advocate the development of critical thinking on these issues? What educational policies exist or can be implemented to create critical awareness about these issues?		*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.*	*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.*

7

Process and Product Monitoring	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?	How will stakeholder's conflicts of interest be controlled? Will partial information be disclosed or will the final results of the project be conveyed?	Role of different industries in financing future developments. Does your economic activity have other goals besides maintaining activity and profit?	Who do you think should be held responsible for the effects / results of scientific research in front of the general public?
	4	4		

TABLE 3, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Regulation	5 How to produce adequate, preventive legislation? Politicians decide the advancement of this technology in several phases of research	2 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?	3 Decision on use of information: civil, military / national defence, security	1 Decision on use of information: civil, military / national defence, security
Power and control	11 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?	1 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?	1 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?	5 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?
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	10 Democratization, equity (inclusion vs. exclusion), access to drugs and devi What about accessibility to the research?	1 Democratization, equity (inclusion vs. exclusion), acces drugs and devices What about accessibility to the research?	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)
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)	Definition of ethics/ values associated with research and use of information	Definition of ethics/ values associated with research and use of information
	14	1	1	

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)	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
Funding	Would the division of funding be made equally by the various areas (health, military force, etc.)? 7	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) 1	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 a 10 interfaces from being used for crime and war	1	1	
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)	
Focus on the A.I.	How to ensure the formation of an ethical committee for monitoring advances in 2 A.I.; How to control the progress of the A.I.	Slowdown of the inventive processes so as not to lose breath; How do we ensure that A.I. use for military purposes does not 2 control or annihilate us? How do we sto machine with A.I. from killing innocent or from having a bug and killing indiscriminately?	Slowdown of the inventive processes so as not to lose breath; How do we ensure that A.I. use for military purposes doe 4 not control or annihilate us? How do stop a machine with A.I. from killing innocent or from having a bug and killing indiscriminately?	14
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?	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 2 he products of this R&D (innovation)	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, 1 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 u 2	How to put limits to the political/ economic/ military use by institutions with malicious intentions? How to ensure the ethical/ moral integrity 4 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?

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?	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?	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

7 10

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Legislation/ Regulation	Medicine: what restrictions and regulations will be imposed on pharmaceutical industries for them not to manipulate both the market and users? 1 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? Address the non-invasion, everyone should be able to live his own individuality. Security of society, importance of laws, political leadership.	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?	2	4
Future?	What constraints and challenges are posed to the evolution of the human species? (given climate change and the autonomy of technology)	3	How to respond to: a) sustainability and technology, b) environment, c) climate	What constraints and challenges are posed to the evolution of the human species? (given climate change and the autonomy of technology) Parallel lives: a) men, b) machine/robot, c) living in another planet

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Ethics		How can researchers continue their investigations without violating the rights of common citizens, and - instead - work for the common good? Civil rights/ robot rights: limits and challenges	Raise awareness in a way that decisions are not made only based on money (monetary)	Make each person aware of themselves and of the world in which they are living.
Liaison/ Coordination	How to articulate institutional partnerships/ scientific advances			
Safety	Research and dual use - invasive/ im[13]er access: a set of laws should be established that safeguard the security of individual privacy. How will it be defined?	Artificial Intelligence: How will AI be monitored and controlled?[2]	Brain-computer interfaces: ensure that no stakeholder can misuse technology (e.g. consumer manipulation, influencing opinions). How do we guarantee this?	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?
	13	2		1

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?	How far is it beneficial to increase human potentialities?	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)?	How to ensure access to information (for everybody)? [3]t 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)?	[1]How to ensure access to information (for everybody)? [2] What is already being done and what impacts does it have or had (public unawareness)?
	2	8	7	

Economic benefits	Economic benefits to companies (allowed income, financing, results' presentation)		Economic benefits to companies (allowed income, financing, results' presentation)	
Social benefits	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)	Who benefits from the results of this research? (main and secondary beneficiaries)
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)?	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?	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	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

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1

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3

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Annex 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 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	*19*
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.	*9*
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	*14*
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	*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	*23*
b. No	*5*
c. I don't know/do not wish to answer	*1*