Citizen's view on neuroscience and dual use

[Lithuania]

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Content

Summary of results

During the discussions throughout the day there was a clear tendency that despite of the fact, that the dual use of research in neuroscience is seen as a problematic topic, whereas citizens feel left behind and see the use of the results almost impossible to avoid in the military field, the participants were of the opinion that the positive aspects and potentials related to neuroscience outweighed the potential risks and negative consequences and were more likely to support and approve research on neuroscience.

Participants were, in general, consensual and agreed almost immediately that any kind of research shouldn't be used for malicious purposes and self-seeking, though it might be hard to obtain and there is a lack of a proper legal framework. Moreover, the belief was expressed, that advances in medicine are essential as it impacts life expectancy and quality despite of all ethical questions, that still need to be answered, the possible risks or negative aspects.

One of the most central concerns were understanding the military purposes and separating potential positive and negative consequences as well as deciding whether the research results should be used or even associated with military agencies and similar researches funded by the military. Issues as the lack of information about the ongoing military actions and insufficient legal framework were described. The other frequently recurring worry has been the perception of a person and the potential change of values that might happen due to rapid technological advancement. Furthermore, the possible threats of being manipulated, acting against one's own will, or potential wars circulated throughout all the rounds of discussions, however, citizens emphasized the differences between defensive purposes and potential abuse for personal gain and when possible kept reminding one another about the substantial research contribution to the quality of everyone's lives. Some of participants expressed their concerns about possible long-term negative consequences including human evolution itself. Generally, citizens were consistently concerned about security issues even if the positive aspects of the development were highlighted previously by themselves.

It is worth noting that during the third round there were more thoughts on financial matters and affordability of new technologies, although these questions were not of key interests during the previous discussions.

Most of the dilemmas that might be caused by such development could be covered by some of these topics: ethical aspects of human and /or robot perception, potential physiological change of the human body due to new technologies or devices, fear of a significant change in social life (less job vacancies, less personal contact, people are replaced by various devices), lack of measures to ensure security.

Whether the research results had the potential for dual use by militaries or defence agencies were less important to the citizens than that research conducted was intended to improve health, social life, learning and life quality in general.

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

The discussion started from an activity in which all participants had to write down their thoughts and associations on neuroscience. The general opinion from the post-its of the participants is focused on the brain research, artificial intelligence, human physiology. A great share of these notes cover medicine, including both diagnostics and treatment.

In the first round of discussions, all groups stated that despite the positive effects on our everyday-lives, the dual use of neuroscientific research is a problematic topic as citizens feel left behind and see the use of the results almost impossible to avoid in the military field. Participants also mentioned the lack of information about ongoing military actions as well as the possible consequences of neuroscientific research in military. Three of the six groups discussing the first given question already expressed their wish to distinguish military purposes between defensive and destructive ones and described such difference as of great importance, identifying possible threats and harmful or malicious actions concerning their private or social lives (being highly influenced or manipulated, losing control over self, body and mind included, etc.), as well as country/state or international interests (abuse of power, chance of a war, etc.) Nevertheless, the views of all groups reflect peaceful aspirations to be one of the most essential dilemmas of possible dual use. The participants declared to be much less concerned while discussing possible use of the research results and technological development for the defence or counterterrorism directed military purposes, although all of the group conclusions indicated a certain level of suspicion relating to possible lack of control and a fine line between "good" and "bad" intentions.

More discussions were caused by the second part of this topic in the matter of collaboration with other initiatives/organisations funded by military agencies or institutions. Participants found their knowledge about the research and funding processes insufficient to decide whether or not Human Brain Project should collaborate with other projects in this certain field and if so, to what level? Can collaboration be considered to be an exchange of small amounts of specific information? Or should it provide all of the substantial data? Is it possible to limit the use of the information/data/ results provided to prevent the possible misuse for military purposes? These were the most troublesome questions addressed to the topic. Regardless of these issues, most of the groups (4 of 6) decided that collaboration in these kinds of research is necessary in order to guarantee steady scientific and technological progress. Only one group disagreed on the possibility to collaborate. Nevertheless, concerns of possible misuse should be taken into consideration as well as the need for a proper legal framework.

When it comes to the question of organisations being able to receive funding from the HBP, citizens were more concerned about potential conflict of interests and the ethical aspects of dual use of the research. Only one of the groups strongly disagreed with the idea of HBP funding an organisation if it already does a military funded research while all of the other groups were more positive, stating that technological development is essential disregarding the possible ethical dilemmas as the benefits outweigh potential threats. It was also indicated, that there is a need for special terms, conditions or obligations (such as contracts, agreements, peace treaties, etc.) or other preventive measures under which a particular

initiative or research should be conducted so that such funding would include more supervision or responsibilities for the other party.

While there were worries regarding the lack of legal framework, its problematic implementation and the ethical challenges it is clear that citizens are more likely to support the idea of research in neuroscience despite its hypothetical negative outcomes or possible use for military purposes.

Results from Round 2: three areas of research

Medicine

As health is one of the subjects that concern everyone, the participants tended to respond in a more hopeful and optimistic way compared to the other two areas given in this second round of discussion.

When addressing the positive aspects, opinions largely coincided on the benefits of developing new medicines, diagnostic and treatment technologies. This would provide a great foundation for more effective treatment as well as it would increase life expectancy and quality. It was also noted, that development in this area could introduce a more sustainable environment (less chemical waste) including prevention of medical testing and experiments on animals.

When it comes to the negative aspects, citizens are mostly concerned about the possible developments of addictions, diseases, new forms of side effects in addition to the creation of new narcotic or toxic substances. In general, the dilemmas that might be caused strongly rely on the negative aspects noted. The participants particularly focused on influencing the perception of the world, "breaking away from reality", as well as the possible malicious use of medicines against a person will in order to benefit from him/her.

In spite of the variety of negative aspects and possible dilemmas caused, the positive ones are considered to outweigh them, especially the development of diagnostics and the advances in treatment. However, doubts were not avoided – one of the groups noted that it is likely that negative aspects may outweigh the positive ones over time as there are still a lot of ethical questions that need to be addressed.

When asked whether participants were concerned about this research being conducted, only one group expressed their concern about development of new diseases, while other groups were positive. One of those indicated that the group had concerns before, but they've felt more reassured at the time, although the development in the field of genetics is still considered to be rather frightening.

Artificial intelligence (computer learning)

Discussions considering this certain topic were much more detailed in most of the groups; however, all of the groups' final notes on citizen approaches to artificial intelligence are quite similar. Both positive and negative aspects focus mostly on the artificial intelligence impact on the labour market.

Participants were positive about artificial intelligence based robots to take over some of the daily tasks and workload in general and found it to be an opportunity for humans to have more time for creative process rather than technical work. On the other hand, participants indicated a fear of work loss and reduced number of job vacancies in general, as well as a possible lack of basic skills needed for simple tasks regarding the workload transfer to artificial intelligence based devices.

Some of the groups also mentioned other positive aspects such as possible replacement of people working under hazardous conditions so there would be fewer risks to human health. When it comes to health, one of the groups also proposed a hypothesis, that development of artificial intelligence might significantly reduce suicide rates in the future, as a person could rely on it as to a friend or a teacher and with its analytical skills artificial intelligence could detect the potential signs of such attempts more quickly and

prevent it from happening. Nonetheless, an active role of artificial intelligence could also be conditioning the loss of social skills, reduced intelligence and continuous laziness, as well as the threat of turning against humanity.

Among the main dilemmas, citizens have thought of these: human-robot relationship, loss of individuality or originality, possible unsafe environment, eco-technological issues, and of course, possibility of artificial intelligence taking over not only regular tasks, but also – control, as it could outrun us in no time and there is no clear understanding of who should be responsible for handling such a situation.

When asked about which – positive or negative – aspects outweigh one another, participants expressed two kinds of opinions. Half of the groups (3 of 6) decided that the ratio between positive and negative aspects is more or less equal, while the others noted that positive aspects are outweighing the negative ones, though the risks were also identified and included in the final answers. As for concerns, the responses match the previous question. The 'positive' groups expressed no concern at all, while the others mention both negative and positive feelings.

Brain-computer interfaces

The opinion on this area of research was mostly consensual; however, it should be taken into consideration that discussions mostly revolved around invasive interfaces, therefore the concerns expressed in this particular part of the project may not necessarily comment on the non-invasive ones.

All of the groups discussing brain-computer-interfaces except one foregrounded the issue of empowering people with disabilities as an opportunity to improve their quality of life by gaining greater control of the body. This also suits for the persons who have suffered from a limb loss as well as those, who have weaker senses due to physiology or a certain disease. Three of these groups also addressed to the possible use of brain-computer interfaces for self-growth, as such interfaces could be used for both learning and military exercises, experiencing traveling or even improving communication.

Regarding the negative aspects, citizens were more focused on the idea how the invasive interfaces could lead to a person acting against his/her own will, violations of privacy, possible impact on human DNA and further human development, as well as malicious or even terroristic actions.

Participants could not decide on whether development in this area is more beneficial or might cause more damage to humanity, therefore this could be considered as the central dilemma of the discussions. Half of the groups expressed their concerns about possible long-term negative consequences including human evolution itself.

Three groups decided that there is a relative balance between positive and negative aspects, while the other three noted that positive aspects are outweighing the negative ones. As for concerns, one group was extremely positive about the advancements in medicine, two groups noted this topic does not make participants feel concerned at all, while the other three groups revealed they felt somewhat concerned.

Cross-cutting

During the discussions about the development of the given areas there were a few topics that recurred from time to time. Despite one of the separate topics was medicine, comments on possible use of the newest technologies for diagnostics or medical treatment circulated during the entire second round, probably mostly because of health being the topic which, to some level, everyone is familiar with and anyone could benefit from improvements in life expectancy and / or quality.

The highlighted repetitive negative aspects are inevitably the possibilities to use any innovation as a weapon or a threat to the humankind; however, citizens emphasized the differences between defensive purposes and potential abuse for personal gain and when possible kept reminding one another about the substantial research contribution to the quality of everyone's lives.

Most of the dilemmas that might be caused by such development could be covered by some of these topics: ethical aspects of human and /or robot perception, potential physiological change of the human body due to new technologies or devices, fear of a significant change in social life (less job vacancies, less personal contact, people are replaced by various devices), lack of measures to ensure security.

Regardless of the critical sight of the areas mentioned, all of the table discussions were more likely supportive and optimistic of scientific and technological progress even thought a variety of concerns were revealed.

Results from Round 3: Questions to address in the future

Below we present the 9 most voted questions:

15 votes**:**

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

14 votes:

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

12 votes:

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

11 votes:

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

10 votes:

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

In general, 48 different questions were asked, most of them – for researchers and policy makers (15 and 13 accordingly), while only 5 questions were directed at citizens and only 4 – overlapping several parties. Most of the questions inevitably are related to the legal framework regarding the dual use of research results as well as security assurance issues. However, it should be noted that only a small amount of questions aims for the lack of information or for more philosophical in-depth discussions on the topic. As six out of nine most voted questions cover such topics as safety and prevention from malicious acts or misuse of the newest technologies, as well as almost one third of all of the questions are associated with fears or possible threats already mentioned before, especially during the second round of discussions, this round however summarizes the participation in project activities very well – citizens were consistently concerned about security issues even if the positive aspects of development were highlighted previously by themselves.

Key themes present in across rounds

During the discussions across the tables there was a clear tendency that the citizens are more likely to support and approve research on neuroscience and its dual use potential despite all of the threats and possible negative outcomes discussed throughout the day.

Two topics were specifically consensual and have been agreed on almost immediately: 1) any kind of research shouldn't be used for malicious purposes and self-seeking; 2) Advances in medicine are essential despite of all the potential risks or negative aspects.

One of the most central concerns were understanding the military purposes and separating potential positive and negative consequences as well as deciding whether the research results should be used or even associated with military agencies and similar researches funded by the military. Issues as the lack of information about the ongoing military actions and insufficient legal framework were described. The other frequently recurring worry was the perception of a person and the potential change of values that might happen due to rapid technological advancement.

Demographic profile of participating citizens

Description of how well the participating citizens reflect the population in your country:

The age distribution of the participants that been involved on the day, is a bit misrepresented, because the main factor of choosing participants was their living place, not an age, that is the main reason why the main percentage of participants is on age category 18 – 34.

Data on the participating citizens:

Age:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group (general population)
18-34:	15	12	37,5%
35-44:	4	1	3,125%
45-54:	8	5	15,625%
55-64:	9	9	28,125%
65-74:	5	5	15,625%
75 - :	0	0	0%

Gender:	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the gender (general population)
Men:	13	11	34,375%
Women:	28	21	65,625%
Other:	-	-	-

Education	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
Primary and lower secondary education:	-	-	-
General upper secondary education :	15	11	34,375%

Vocational Education and Training:	12	12	37,5%
Bachelor or equivalent:	8	7	21,875%
Masters or equivalent:	6	2	6,25%
Doctoral degree or higher:	-	-	-

Geographical zone (percentage of population living in…):	Participants confirmed for the workshop	Participants showed up for the workshop	Percentage of the age group compared to the general population
City:	14	11	34,375%
Town:	17	15	46,875%
Rural:	10	6	18,75%

Other aspects of relevance in your country?
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Annex 1 – Translated templates from round 1

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

> Research could be used for providing emergency assistance in extreme situations, so that there would be no need for putting any other person in danger.

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

> It seems more problematic as there is no guarantee that the research will not be used for destructive purposes (for example, war or terrorism)

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

> - Influence and control of a person;
> - Artificial intelligence could replace people;
> - Possibility of creating a humanity destroying weapon

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

> Yes, it does, as it agrees with our approach on the importance of peace and defence.

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

Yes, collaboration should be possible, but only providing "filtered" data, so that the research itself could not be used for harmful purposes.

Please explain why/why not.

For getting better and more comprehensive research results, for our safety and the continuity of life and for the medical development as well.

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

No, it shouldn't be able to

Please explain why/why not.

It is difficult to ensure that the research data will not be used for military purposes. Moreover, the organization should conduct research in only one field.

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

> We, as citizens, think that this is unavoidable - no one will ask for our permission before using the research for the worst.
> Probably the most frightening thing is that military purpose could not only be directed to defence, but also to offensive actions. It's very difficult to define the fine line between the offense and self-defence.
> It would be best that citizens would be informed about the ongoing military actions.

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

> It's more frightening, than anything, because a lot of information is not known. As a small country, we could tell as for ourselves, that we would not use it for military purpose, though the same weapon in the hands of a different country could already be considered as a threat
> Rumors has it that new types of soldiers are being developed, the ones you couldn't describe nor as human nor robot. And it makes us concerned that the technology might turn against us.

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

> Fear, that research on human brain might lead to intentions making a person lose control of its own actions.
> Human-robot soldiers, causing a moral dilemma - is it human or is it robot?

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

> Possibly yes, but there is always that narrow niche where defence turns to offense. There are always two sides to every story, and sometimes it's not that difficult to cross that line.

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

> Project has to collaborate, as for such scientific process it is inevitable and unstoppable.

Please explain why/why not.

> - Conflict of interests might but shouldn't stop the development.
> - There are no guarantees that new inventions won't result in the wrong hands and be used for malevolent purposes.
> - In case of successful collaboration between all the stakeholders, there is no one to conflict with.

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

> If the military funding is directed to ensuring security, then yes, it should be possible. Maybe the neurosciences could help to delete the worst war memories of soldiers and so help their psychological healing process. Collaboration between different researchers or organizations is necessary even if there aren't any funding issues included.

Please explain why/why not.

> We believe that it's important that the country/state itself should show and develop scientific initiatives more than individual organizations as it could be considered a security ensuring step as well as the ability to identify and eliminate the possible threats.

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

> Research should be only used for peaceful purposes. We wouldn't like that it would be used for military purposes, though we believe that is impossible to avoid. The benefits of the various research projects are unquestionable even though the results might be used for not only citizen purposes.

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

> It's pretty much frightening, because the research could be used for really harmful purposes. One might want to influence one's mind. On the other hand, some of such processes are already happening in the areas of advertising or business. It is frightening to lose trust in kindness of humanity.

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

> We are most concerned about possibility to use the results in order to affect our mind or emotions, so that a person would become and act more like a favorable machine and not an exact human being. Moreover, we find possible use of A.I. by the intelligence or military agencies dangerous and concerning. In any case, we think it depends on the purpose the research or technological development is being conducted, created and / or used.

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

> Of course, we find it positive, if the use of the research is based on good intentions. Although, various institutions might affirm peaceful purposes while acting differently.

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

> We find it difficult to decide as it depends on the purpose:
> 1. The project shouldn't collaborate due to norms of ethics;
> 2. The project should collaborate to achieve more results faster

Please explain why/why not.

> We find the collaboration possibly unethical, although such collaborations might make various researches more effective and in case of defensive or peacekeeping purposes would be considered especially well.

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

> If depends on the exact project - if it could only be used for civilian purposes, then it should be possible.

Please explain why/why not.

> Even the thought that military agencies would give funding to such organizations or researches means that their results or further activities are important to military organizations. Though we consider it to be more positive if it helps making more discoveries. In any case, the purpose is the most important.

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

> We have two kinds of questions:
> 1. It's seems like we're left behind and no one asks for our opinion. Military structures carry out their activities over our heads in one way or another. We feel somewhat uncomfortable for not knowing what's going on and how it will be used later. It also seems like we move on from the real, physical war to virtual one.
> 2. We're glad that it might push all of us forward - as a society we're going ahead with the new technologies, we are improving and so we can use it for better purposes as a part of our progress.

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

> There are different types of people, so, naturally, some will find it problematic or frightening, and while the others will not mind things they don't know or understand. One might feel reassured and concerned all at once, when he or she is informed better than he/she actually needs to be. Mysteries of the ones live might be at least interesting and sometimes beneficial. Though it depends on ones values, statements and

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

> The fact that research results might end in the wrong hands and the use of it might become a threat is definitely concerning especially if there's a possibility of irrational use. On the other hand, we could all benefit from developments and growth in this field.

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

> If any actions or programmes are being used rationally, we would take a positive approach. But you never know how it might turn out.

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

> Definitely YES. Only by working together, we can reach the project goals faster and more effectively. So the potential use of the results will come to light faster too.

Please explain why/why not.

> By doing so, we save our time and other resources as well we aim for the results faster.

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

> Yes, if it is used in a wide range of applications.

Please explain why/why not.

> If it could be used on different kinds of people (working in different fields), research results might point out or tilt our society the other way. For example does an agricultural specialist see the results differently or does he see it in the same way a researcher does?

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

> It could be used for defensive purposes.

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

> We find it problematic, because there is a possibility, that devices affecting the brain might be created and used for self-seeking purposes by criminals (killers, thieves, and so on)

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

> We don't feel safe because in case of a war countries may be demolished

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

> Yes, but just for defence or counter-terrorism purposes, nothing more.

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

> Yes, if the project still doesn't take part in any military research. Other agencies shouldn't also use the results of this very project for military purposes, unless it's defence.

Please explain why/why not.

> Both parties should reach a compromise.

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

> Yes, if that's under separate contracts.

Please explain why/why not.

> If different research is conducted under separate contracts, there should be some obligations included, so that one could ensure that results won't be used for other similar projects that military agencies could benefit from.

TABLE 6, Template 1

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

> As they say "Even the road to hell is paved with good intentions". :)

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

> We find it problematic and not reassuring due to possible threat of war.

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

> It's hard to say, if there are any concerns, as we are not familiar with the research data that military or intelligence agencies could use.

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

> Yes, it does make a difference as it would be used for peace and ensuring the good or what makes us happy :)

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

No, it should not, as the project is not allowed to take part in military research.

Please explain why/why not.

It is essential to create, not to destroy.

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

If the research is "for good", it should have the possibility.

Please explain why/why not.

We wish for peace in the world :)

Annex 2 – Translated templates from round 2

What are the positive aspects of this development?

- New medications being discovered, innovative equipment and treatment technologies are being applied;
- highly qualified doctors;
- the opportunities for individualized treatment;
- the effects of medication on the human body have been better investigated.

What are the negative aspects of this development?

The negative (side/adverse) effect of medication and technical equipment on human body, eugenic danger.

What kind of dilemmas will this development cause?

Impact of equipment on the human brain, increased workload for doctors, the need for new specialties in course of the development of science.

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

The positive aspects outweigh the negative ones

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

No, this kind of research can be very useful.

TABLE 2, Medicine

What are the positive aspects of this development?

- Identification of possible illnesses
- Ensuring human security
- Fewer experiments on animals are conducted
- Sales of medication increase GDP growth
- Creating the medication with no side effects
- Greater human work efficiency

What are the negative aspects of this development?

- The possible development of addiction.
- New narcotic substances
- The threat of chemical weapon
- The long-term use of medication will cause side effects

What kind of dilemmas will this development cause?

- The question whether to perform the experiments on animals or humans
- The question of medication financing, i.e. whether it is worth investing in the production process.
- The long-term prospects of the use of medication will be unknown.

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

The positive aspects outweigh the negative; however, it is likely that this may change over time

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

If research is legal, science should advance.

What are the positive aspects of this development?

> There is no need for chemical medication; the treatment with electrical impulses can be used. There are more options for accurate detection of diseases. Natural resources are conserved and the number of experiments on animals is reduced. A possibility to create more accurate medication. A prevention of diseases. The creation of one optimal medication. Applying medical research for the treatment of animals.

What are the negative aspects of this development?

> - If any particular treatment is provided to everyone by force.
> - Medical products that might make a malicious damage on humans, such as poisonous and narcotic substances.
> - The medication might be used for bad purposes - mass destruction of humans.

What kind of dilemmas will this development cause?

> - To diagnose diseases more accurately.
> - To create optimal, less harmful medications.
> - To help control emotions, especially the extreme ones, which, for example, arise among terrorists.
> - The treatment of addictions.
> - To overcome incurable diseases or identify it on time.

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

> The positive aspects outweigh the negative ones

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

> No, we are not.

What are the positive aspects of this development?

It is beneficial for diagnostic processes. Such treatment will have many positive aspects. This would provide the basis for effective treatment. It indicates great progress.

What are the negative aspects of this development?

This will not affect the treatment, because physical treatment with medical products will not affect the emotional world. The body may refuse to perform certain functions performed by the treatment or preparations.

What kind of dilemmas will this development cause?

Distribution of treatment and function of the body. The change in quality of life and health.

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

The positive aspects outweigh the negative ones, especially the diagnostics and the results of treatment

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

We are not concerned at the moment, though we had some concerns before, we don't have it anymore. The area of genetic research is worrying, it's the most uncertain and threatening.

What are the positive aspects of this development?

> It is easier to identify the causes of diseases (e.g. depression) There will be no need to conduct experiments on animals. It would increase life expectancy and quality.

What are the negative aspects of this development?

> Computer simulations can be used to create new drugs/narcotic substances. The technology itself might also be able to develop certain (new?) diseases.

What kind of dilemmas will this development cause?

> Could and/or should the person diagnose the illness himself?

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

> The positive aspects outweigh the negative ones

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

> We are concerned about possible development of new unknown diseases.

What are the positive aspects of this development?

The improvement of human health and well-being

What are the negative aspects of this development?

The use of medication against the will of a person and his/her physiology.

What kind of dilemmas will this development cause?

Creating illusions, creating the effect of "looking through rose-coloured glasses", breaking away from reality.

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

50/50

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

We are positively concerned due to the obvious progress

What are the positive aspects of this development?

> Replacement of humans while working under hazardous conditions, more rapid and accurate processing of information, the use of drones for analysis of the environment

What are the negative aspects of this development?

> Reducing job vacancies, the use in warfare/terrorism

What kind of dilemmas will this development cause?

> Creating an unsecure environment, it may be difficult to control robots, artificial intelligence limitations, human-robot relationship

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

> At the moment, the positive aspects outweigh the negative ones

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

> No concerns raised, there should be a technological development.

What are the positive aspects of this development?

People do not risk their lives in emergency situations, such as fire.
Use for facilitating a personal life.
For industrial development
For scientific research.

What are the negative aspects of this development?

The chances are that the technology will turn against man.
A smaller number of jobs per person.
The use of equipment for malicious purposes.

What kind of dilemmas will this development cause?

The fear is that technology can turn against a man.
Whether the cost will pay off and it will be available to every ordinary citizen?

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

It depends on the people's knowledge of exactly how to use it.
The positive aspects outweigh the negative ones, but there is a risk that it might be harmful for a human.

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

No concerns have been raised so far, because we haven't encountered it.

What are the positive aspects of this development?

Technological development facilitates work and domestic life, you do not have to do many things manually, it allows devoting more time to other things. Through technology, it's easy for all people to perform tasks that are difficult to do on their own (for example, if a person has a physical disability, using an artificial intelligence, some work becomes easy to implement). The Internet is a very useful part of it.

What are the negative aspects of this development?

Relationship among humans becomes strained. Incoming data can be used for malicious purposes. People interact more using a computer than with other people. A person can begin to feel lazy, become dull, uncapable to perform regular tasks.

What kind of dilemmas will this development cause?

To diagnose human diseases, to conduct more precise medical research. It is useful for solving various problems in trade, medicine and other fields. Contact and public relations. It's easier for a person to create, express himself. It helps solve the problems, search for information.

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

The positive aspects outweigh the negative ones. The most important thing is to improve.

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

No, we are not.

What are the positive aspects of this development?

The pace of work is accelerating, we are advancing. We create new things that help people. There is a decrease of the technical work that can be done by artificial intelligence. The creation of this intelligence is already a creative process that leads the society forward. If we succeed in making artificial intelligence creative, it would be a big step forward.

What are the negative aspects of this development?

It reduces human intelligence. It takes over the functions that are necessary for the development of the human mind.

What kind of dilemmas will this development cause?

An artificial intelligence can outrun us, and then we might not be able to stop the process. The question is who will handle everything? Will it make things easier or harder?

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

The ratio between positive and negative aspects is, more or less, equal, there are both positive and negative things.

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

What you don't know can't hurt you. The question is whether we will ever know what's going on and how and whether it really has progressed

TABLE 5, Artificial Intelligence

What are the positive aspects of this development?

> Autonomous robots can perform human work (it would reduce workload);
> By establishing emotional intelligence, a robot can become a friend and / or teacher, thus, possibly reducing suicide

What are the negative aspects of this development?

> Replacing human workers with robots could potentially reduce jobs;
> If a robot became smarter than man, it would put humanity at risk;
> IQ would be likely to decrease as all the work would be performed by robots

What kind of dilemmas will this development cause?

> Will people be needed?
> How to ensure eco-technological development? (so that there are no robotic dumps)

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

> Both are equal

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

> We are concerned about the fate of humanity

What are the positive aspects of this development?

Creating comfort and a quality of life for people

What are the negative aspects of this development?

Exclusion of human factor; loss of social skills.

What kind of dilemmas will this development cause?

The loss of individuality, the loss of originality and human imperfection.

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

For every plus there is its minus

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

The positive progress is good; destruction is bad.

TABLE 1, Brain-computer interfaces

What are the positive aspects of this development?

> Empowering people with disabilities for independent activities, performing certain functions remotely, tracking and controlling people / animals, and applying to medical treatment of diseases.

What are the negative aspects of this development?

> Human control, negative effects on the human body can disrupt human creative powers; Use for warfare / terrorist purposes.

What kind of dilemmas will this development cause?

> Maintenance of creative potential; Health support; Excessive flow of information (its management); Whether the descendants will be affected and how.

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

> The positive aspects outweigh the negative ones

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

> No, we are not.

TABLE 2, Brain-computer interfaces

What are the positive aspects of this development?

People with disabilities can live a life to the fullest;
The application of virtual reality to military exercises

What are the negative aspects of this development?

Does the person remain a human?
Reading thoughts against the will of a man;
Chances are that the wars will be crueller;
Financial payback issue.

What kind of dilemmas will this development cause?

Will a man benefit from this, or will it cause damage to him?

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

The positive aspects outweigh the negative ones, since it can help many disabled people by giving them the opportunity to live their lives to the fullest.

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

We are concerned, because there is a bad side alongside with the good side of this area.

TABLE 3, Brain-computer interfaces

What are the positive aspects of this development?

Providing help for people with disabilities. To help protect against various hazards (fire, other life-threatening situations). To improve or restore human senses. To eliminate post-traumatic stress disorder. To shorten the reaction time. The computer games would provide the opportunity to travel around the world in a virtual reality.

What are the negative aspects of this development?

Dangers of obtaining information from a person without his consent, manipulating the brain, erasing (or adding false) memories, changing the person's personality, forcing a person to act against his will. A person might have difficulties distinguishing between real world and virtual world.

What kind of dilemmas will this development cause?

It would identify the problems with the brain or mind, in case of suffering from, for example, insomnia, anxiety, depression, etc. To analyse vital functions. It is useful for brain research. It is helpful to clarify the limits of human brain capabilities.

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

There is a relative balance between positive and negative aspects, however the positive ones slightly outweigh the negative ones

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

No, we are not.

What are the positive aspects of this development?

Looking forward to the future, the senses of the human beings would have improved. It would be possible to improve communication between people. This would facilitate the lives of people with disability or limb loss.

What are the negative aspects of this development?

Human thoughts change very quickly, and the computer may not keep track of these changes. In the military industry, the soldiers can be turned into violent machines. We think that it will have a negative impact on human DNA and further human development.

What kind of dilemmas will this development cause?

Will the long-term process have negative consequences? There are two sides: one can severely harm a person, and the other can help in the life process. "The road to hell is paved with good intentions"

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

Both sides are of equal importance.

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

We are concerned due to certain limitations.

TABLE 5, Brain-computer interfaces

What are the positive aspects of this development?

> The treatment of mental illnesses, reimbursement of disability, increase of life expectancy and improvement of life quality, use of virtual reality for learning

What are the negative aspects of this development?

> Invasive interfaces can be harmful for a person
> It may be difficult to distinguish reality from virtual reality;
> Violations of the right to privacy and, possibly, to copyright;
> It is easier to manipulate people

What kind of dilemmas will this development cause?

> Should we install chipsets or other invasive interfaces? How to distinguish between VR and reality?

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

> The positive aspects outweigh the negative ones, as the contribution of the positive aspects is more substantial

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

> We are slightly concerned.

TABLE 6, Brain-computer interfaces

What are the positive aspects of this development?

Human well-being

What are the negative aspects of this development?

We are against the negative programs installed inside the human.

What kind of dilemmas will this development cause?

The use aiming for demolition of evolution

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

50 % / 50 % :)

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

We are happy about research oriented towards medical achievements.

Annex 3 – Translated templates from round 3

TABLE 1

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	Will there be any legislation to ensure public safety? **(15)**	Will AI be able to restrict people mental capabilities or creativity? **(12)**	Will the results be used to create new diagnostics and treatment measures? **(4)**	
	What kind of restrictions will be in place for AI activities? **(2)**	What kind of effects does this research or invasive procedures have on human brain and body? **(3)**	Will there be new medicines created with fewer side effects? **(5)**	
		Will there be selection for the "good" genes? If so, doesn't such selection violate human rights? **(3)**		

Annex 3 – Translated templates from round 3

TABLE 2, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	There are no limits for improvement; however who can say that we have reached the end? Robots? **(12)**	If people will start having microchips integrated in their brains, do those microchip creators will not use them to manipulate people? **(7)**	How often new technologies will be introduced (presented) to public? **(5)**	Do you think that human rights will be violated if there will be possibility to read our thoughts? **(7)**
	How much resources can be required for this research? **(0)**			
	Should there quantity limitations for AI robots? **(2)**	Is there a possibility and if so, when can we expect to create new limbs for people? **(1)**		
	Could AI be associated with politics? **(2)**	Will new technologies be available and affordable for ordinary users? **(9)**		

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Annex 3 – Translated templates from round 3

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Political improvement	Do you think that AI improvement in the future could help to assist and increase quality of our legal framework? **(7)**	When do you think AI will be able to replace 20 political parties and we will have 2 or 3 of them who will be interested in working for benefit of Country instead of themselves? **(6)**		
Continuation and benefits of the project		Do you think that thoughts which were expressed today will have any value? Will we be able to see final results? How will different social groups be involved in this research? **(5)**		
Human Rights	How can we make sure that personal information is secured when AI will be available to bigger audiences? **(9)**		Will there be individual selection how brain and computer interface is used? **(1)**	
Preparation for future technologies			What reforms will be done to prepare specialists who will be needed for mentioned research areas? **(4)**	What can be done by each of us to prepare for changes which will be coming in the future? **(8)**
Business			Is it possible that research results used in medicine could develop into new uncontrollable business? **(3)**	

Human Brain Project

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Annex 3 – Translated templates from round 3

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Consequences	Does (and if so – how?) the state plan to prevent from the threats related to AI? Or everything will be done *post factum*? **(10)**	What consequences can we face and who will be responsible for them? Will there be study done to investigate if AI does not distort human nature? **(11)**	How could Lithuanians be affected by research results? **(2)**	
	How does the state plan to fix currently increasing technological and informational exclusion? **(5)**		How to create a program for the general public's cultural development and use of different knowledge and achievements? **(1)**	5 things Lithuanians would like to know regarding this research. **(6)**
	What political message is being sent out to public in regards to human brain research? **(1)**		Why is there a lack of purposeful innovation policy in our society? **(2)**	
	How capable is our country to fund such scientific researches? **(2)**			

Annex 3 – Translated templates from round 3

TABLE 5, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
Security	What kind of documents or policies should be passed to ensure everyone's safety and how can we ensure that new technologies would not be used against us? **(12)**	Is it possible (if so –how?) to stop/neutralise a robot/AI if it becomes self-willed and malicious **(14)**		
Quality	Who should be responsible for the quality assurance of new devices? **(4)**			
	How should ordinary people know if all of the conducted research results are correct? **(3)**			
		What is the probability to program a certain AI so that it would be nothing but favourable to people and how ensure that there would be no mistakes or loopholes in the code? **(5)**	What measures should be taken by the stakeholders concerning scientific and innovation practices? **(7)**	
				Should citizens know everything regarding the use of new devices even if it is not relevant for them? **(3)**
		Shouldn't the new treatment measures based on the newest technological development be created while the use of medicines with side effects be reduced in the treatment of mental / psychological disorders / diseases? **(5)**		

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Annex 3 – Translated templates from round 3

TABLE 6, Template 6

Themes suggested by the group	Policy-makers	Researchers	Stakeholders	Citizens
	Why are you not providing enough funding for realisation and use of innovations? **(4)**	What kind of AI is needed to end wars between the different countries? **(5)**	Is there any agency, which aims to introduce new inventions to the public? **(11)**	Why are technological innovations being used rather reluctantly? **(1)**
	Why are you hiding the new discoveries from those seeking for information about it? **(2)**	Do you think that there is possibility for AI to rebel against humans? **(10)**		
	How can one impact the decision-makers' negative opinion and make it more positive? **(4)**			

Annex 4 – Results from morning survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

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

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

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
10	*7*	*9*	*4*	*1*

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

    a. Yes   *21*
    b. No   *5*
    c. I don't know/do not wish to answer   *5*

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

    d. Yes, the most important thing is to make progress in the research.   *13*
    e. Yes, but only if it is based in another EU member state.   *0*
    f. Yes, but only if it is based in an allied country of the European Union   *3*
    g. Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons   *7*
    h. No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.   *6*
    i. I don't know/do not wish to answer   *2*

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

    a. Yes   *18*
    b. No   *8*
    c. I don't know/do not wish to answer   *5*

Annex 5 – Results from afternoon survey

QUESTIONNAIRE ON NEUROSCIENCE AND DUAL USE

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

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

Not concerned at all	Slightly concerned	Moderately concerned	Somewhat concerned	Extremely concerned
7	*7*	*8*	*7*	*2*

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

j.	Yes	*21*
k.	No	*8*
l.	I don't know/do not wish to answer	*2*

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

m.	Yes, the most important thing is to make progress in the research.	*17*
n.	Yes, but only if it is based in another EU member state.	*2*
o.	Yes, but only if it is based in an allied country of the European Union	*3*
p.	Yes, but only initiatives or organisations in countries, who have signed and ratified international treaties on e.g. chemical or biological weapons	*7*
q.	No, the research project should not collaborate with initiatives or organisations funded by military or defence agencies.	*2*
r.	I don't know/do not wish to answer	*0*

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

a.	Yes	*23*
b.	No	*7*
c.	I don't know/do not wish to answer	*1*