

SGA2-SP12 M24 reporting
Progress report of SP12 for M24 SGA2
(D12.5.2 - SGA2)

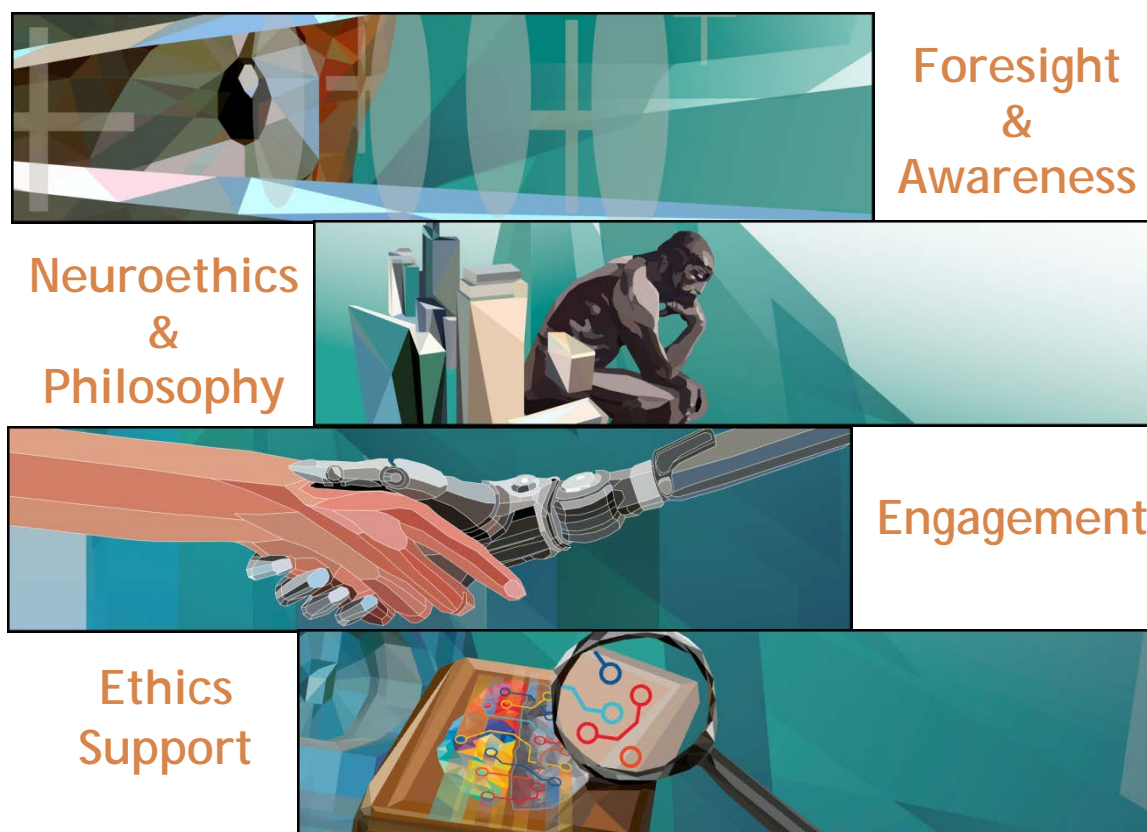


Figure 1: Ethics and Society in the Human Brain Project (HBP)

We pursue a responsible research and innovation agenda and practice in the HBP along four main lines of enquiry and action.

Project Number:	785907	Project Title:	Human Brain Project SGA2
Document Title:	SGA2-SP12 M24 reporting, Progress report of SP12 for M24 SGA2 (D12.5.2 - SGA2)		
Document Filename:	D12.5.2 (D79.2 D49) SGA2 M24 ACCEPTED 201123.docx		
Deliverable Number:	D12.5.2 (D79.2, D49)		
Deliverable Type:	Report		
Work Packages:	WP12.1, WP12.2, WP12.3, WP12.4		
Key Result(s):	KR12.1, KR12.2, KR12.3, KR12.4		
Dissemination Level:	PU = Public		
Planned Delivery Date:	SGA2 M24 / 31 Mar 2020		
Actual Delivery Date:	SGA2 M26 / 04 May 2020 ; resubmitted 23 Nov 2020; accepted 23 Nov 2020		
Author(s):	Sara MARTINEZ, FT (P19)		
Compiled by:	Sara MARTINEZ, FT (P19)		
Contributor(s):	Chloe HELSEY, Christine AICARDI, Nikolas ROSE, KCL (P38); Arleen SALLES, Michele FARISCO, UU (P83); Aske PALSBERG, Lise BITSCH, Nicklas Bang BÅDUM, FT(P19)		
SciTechCoord Review:	Martin TELEFONT, EPFL (P1)		
Editorial Review:	Annemieke MICHELS, EPFL (P1)		
Description in GA:	Progress report SP12 M24 SGA2		
Abstract:	<p>The Ethics & Society group has helped integrate and coordinate the ethical approach championed by HBP. This HBP approach continues to guide worldwide discussion and guideline development in fields like neurotechnology, AI and Big Data in Medicine. SP12 has influenced the development of reference guidelines and analyses for new pressing issues at the interface of neuroscience and technology, including data protection and dual use championing the European responsible research and innovation (RRI) approach. The group has also organised international engagement activities for citizens and stakeholders across Europe. During this period of the Project the group submitted their third Opinion, the Opinion of AI.</p> <p>The present Deliverable details the progress made between April 2018 and March 2020.</p>		
Keywords:	Human Brain project, Ethics, Neuroethics, philosophy, Foresight, Engagement, compliance, data management, infrastructure, responsible research and innovation		
Target Users/Readers:	general public, scientific community		

Table of Contents

1. Overview	5
2. Introduction	6
3. Key Result KR12.1	7
3.1 Outputs	7
3.1.1 Overview of Outputs	7
3.1.2 Output 1: Issues in mental health and disorders	7
3.1.3 Output 2: Communities and infrastructure building	8
3.2 Validation and Impact	9
3.2.1 Actual and Potential Use of Output(s)	9
3.2.2 Publications	9
4. Key Result KR12.2	9
4.1 Outputs	9
4.1.1 Overview of Outputs	10
4.1.2 Output 1: A theoretical model of consciousness and criteria for ascribing consciousness ..	10
4.1.3 Output 2: Proposal for a dynamic understanding of human identity that accounts for context and culture	11
4.1.4 Output 3: Fundamental Neuroethics as Methodology	11
4.2 Validation and Impact	12
4.2.1 Actual and Potential Use of Output(s)	12
4.2.2 Publications	13
5. Key Result KR12.3	13
5.1 Outputs	14
5.1.1 Overview of Outputs	14
5.1.2 Output 1: 360 Methodology	14
5.1.3 Output 2: Overview and assessment of severity of societal challenges posed by AI along with recommendations for how to handle them	14
5.1.4 Output 3: Insight into Europeans' informed and considered views on Artificial Intelligence - Results from EuropeSay on AI	15
5.1.5 Output 4: GlobalSay Methodology	15
5.1.6 Output 5: Overview of public engagement activities and potential for collaboration on neuroethical issues in global collaboration	15
5.1.7 Output 6: Lessons on community engagement	16
5.2 Validation and Impact	17
5.2.1 Actual and Potential Use of Output(s)	17
5.2.2 Publications	17
6. Key Result KR12.4	18
6.1 Outputs	18
6.1.1 Overview of Outputs	18
6.1.2 Output 1: Ethics Dialogues blog	18
6.1.3 Output 2: Data Policy Manual (DPM)	18
6.2 Validation and Impact	19
6.2.1 Actual and Potential Use of Output(s)	19
6.2.2 Publications	19
7. Conclusion and Outlook	20

History of Changes made to this Deliverable (post Submission)

Date	Change Requested / Change Made / Other Action
04 May 2020	Deliverable submitted to EC
29 Jul 2020	Resubmission with specified changes requested in Review Report Main changes requested: <ul style="list-style-type: none"> • All reports that have not been published should be made public and available to external audiences and citizens. The consortium should make sure that all outcomes should be made accessible to the public.
21 Nov 2020	Revised draft sent by SP/CDP to PCO. Main changes made, with indication where each change was made: <ul style="list-style-type: none"> • Footnote added referring to public document in Section 3.1.1.1 and Section 3.1.2
23 Nov 2020	Revised version resubmitted to EC by PCO via SyGMa

1. Overview

The Ethics & Society group of the Human Brain project (HBP) brings together internationally recognised scholars and practitioners from the humanities and social science. Of all the Brain Projects in the world, the Human Brain Project stands out for its dedication to Responsible Research and Innovation (RRI)¹.

The Ethics & Society group has helped integrate and coordinate the ethical approach championed by the HBP. This HBP approach continues to guide worldwide discussion and guideline development in fields like neurotechnology, AI and Big Data in Medicine. SP12 has influenced the development of reference guidelines and analyses for new pressing issues at the interface of neuroscience and technology, including data protection and dual use championing the European responsible research and innovation (RRI) approach. The group has also organised international engagement activities for citizens and stakeholders across Europe. During this period of the project the group submitted their third Opinion, the Opinion of AI.

The present Deliverable details the progress made between April 2018 and March 2020.

¹ The International Brain Initiative (IBI) is an alliance of some of the major brain research projects from Europe, Japan, Korea, the United States, China and Australia. IBI was established in recognition of the fact that no single project will be able to tackle the challenge to better understand the brain by itself. IBI recognises that neuroethics is a key concern and is also doing work in the field of neuroethics. However, the Ethics and Society group of the Human Brain Project is dealing with neuroethical issues in a broader sense, e.g. by facilitating stakeholder engagement and citizen dialogues which is unique among the brain projects.

2. Introduction

What would happen if we would better understand how the human brain functions? The Human Brain Project aims to put in place a cutting-edge research infrastructure that will allow scientific and industrial researchers to advance our knowledge in the fields of neuroscience, computing and brain-related medicine.

Ethics and Society is part of the Human Brain Project's (HBP) research core. The group undertakes research into neuroethics and philosophy, foresight, public engagement and researcher awareness, and it runs ethics support and compliance programs for the whole of the HBP. In addition, the group collaborates with an external and independent Ethics Advisory Board (EAB).

The Foresight Lab has through foresight and empirical social science analysis focused on 1) HBP-related issues in mental health and disorders, and 2) Communities and infrastructure building in the HBP. Results address current opportunities and issues facing clinical translation of AI applications to neurodiagnostics neuroscience, and strategies of user engagement and community building around research infrastructures, with a special focus on the HBP (Key Result KR12.1). Results will be used further in SGA3 both in the Work Package Responsible Research and Innovation (RRI) and for the Inclusive Community Building Task.

The Neuroethics and Philosophy group has refined their developed neuroethical methodology (fundamental neuroethics). This methodology is used to enhance the "reflection" dimension of Responsible Research and Innovation and is internationally recognised as a significant contribution to the field of neuroethics. The methodology is being used to develop a model of and criteria for consciousness and neuronal epigenesis (cultural impact on brain architecture) and human identity (Key Result KR12.2).

The Public Dialogue and Engagement group has been active in international collaboration and public engagement on neuroscience. It has organised an international citizen engagement on AI across Europe (EuropeSay) and arranged a large workshop (AI360) for recognised experts in rights and ethics, law, social science, culture, politics and economy for a multi-dimensional and thorough treatment of AI and its implications for our future societies. Furthermore, the group's work with stakeholder engagement and community building until the end of SGA2 has formed a central starting point for community building in EBRAINS in the final phase of the HBP (Key Result KR12.3).

The Ethics Support group has through SGA2 developed research-based good practice for ethics dialogues, RRI and international ethics-related collaboration with stakeholders within and outside of the HBP, including EAB, Ethics Rapporteurs, Data Governance Working Group (DGWG), Dual Use Working Group and others. Good practice examples include the revised Data Policy Manual and Ethics Dialogues Blog (KR12.4). Good practice has been disseminated using various channels, including webinars and scientific publications.

The present Deliverable details the progress made between April 2018 and March 2020 (internally known as M1-M24 in SGA2).

3. Key Result KR12.1

In SGA2 the Foresight Lab will produce briefing reports stemming from foresight and empirical social science analysis of key conceptual, ethical, clinical, and social questions focussed on two main themes:

- 1) *Issues in mental health and disorders*
- 2) *Communities and infrastructure building.*

Achieved through: - engaging with HBP researchers and cognate groups of researchers - working on developments in neuroscience, psychiatry, ICT, and robotics, especially those linked to other major brain projects.

3.1 Outputs

3.1.1 Overview of Outputs

3.1.1.1 List of Outputs contributing to this KR

- Output 1: 1st briefing report, on Machine Learning and Big Data for Neuro-Diagnostics (T12.1.1 & T12.1.2), (C1933), (MS12.1.1)².
- Output 1: 2nd briefing report, on Formal and informal Infrastructures of Collaboration in the EU's Human Brain Project (T12.1.1 & T12.1.2), (C2297), (D12.1.1).

3.1.1.2 How Outputs relate to each other and the Key Result

The outputs are not prerequisites of each other but are important to achieve each aspect of the Key Result. Output 1 for Issues in mental health and disorders and Output 2 for Communities and infrastructure building.

3.1.2 Output 1: Issues in mental health and disorders

Building up from the HBP Ramp Up Phase Foresight Report on Future Medicine, the Foresight lab has conducted research on the implications of the potential identification of brain-based markers for the diagnosis of psychiatric and neurological disorders in clinical contexts, and more broadly on the state of the art in relation to psychiatric and neurological diagnostics, with a focus on the role of brain signatures and their clinical, personal, social and ethical implications.

This HBP-specific research has used an approach based on a mix of qualitative methods:

- Two periods of fieldwork in HBP labs (Department of Knowledge Technologies at Jožef Stefan Institute, Ljubljana, Slovenia; Theoretical Neuroscience Group at the Institut de Neurosciences des Systèmes, Marseille, France)
- Individual interviews of several SP8 Work Package leaders
- Desk-based bibliographic analysis of contextual literature and of policy documents
- Individual interviews of experts in policy and regulation around medical devices

² Public version of document: https://wiki.ebrains.eu/bin/download/Collabs/hbp-sga2-sp12-documents-for-the-m24-revi/WebHome/hbpforesightlab_2019_neurodiagnostics_briefingreport_public.pdf

Result: 'Machine Learning for Neuro-Diagnostics: Opportunities and Challenges for Clinical Translation', a briefing report for the Human Brain Project' (MS12.1.1)³ (C1933).

We have conducted broader research on the future of psychiatry and the potential role of neuroscience. The conclusion is that most forms of mental distress, including severe mental disorders (psychoses) should be understood as arising from social adversity across the course of life, acting on neurodevelopment increasing or decreasing susceptibility. Mental disorders should thus be understood as social adversity disorders with consequences for neural processes, not brain disorders with consequences for social functioning. Mental distress cannot be understood through studies of isolated brains in animal models or computer simulations but arises from the development and experience of whole organisms in their physical, interpersonal, social and cultural milieu across the life course. There is no evidence for the belief that mental distress comprises a number of distinct disease conditions each with a unique biological basis, and there are no clear distinctions between 'normality' and 'mental illness' or within the various modes of mental distress. Existing psychiatric drugs do not target the causal pathways of mental disorders or mental distress and should only be used for short term symptom reduction. Neuroscientific research should not proceed by investigating the isolated brain, searching for genetic or other biomarkers and brain signatures of disease, but should uncover the pathways, from birth onwards, by which the development of neural processes are shaped by the immersion of the organism in its environment, and in particular the ways in which various forms of adversity and exposures to environmental insults can shape the human brain, and the practices and experiences which can buffer and reverse the effects of adversity.

Result: Rose, N. (2018). *Our Psychiatric Future*. (London: Polity)⁴.

Beyond the State of Art: Existing socio-ethical and legal guidance regarding the application of predictive analytics and other AI techniques in the clinic for automated diagnosis emphasises the need to focus on increasing public trust in order to enhance adoption rates. The report shows instead that the trust of end-users of Clinical Predictive Models (CPMs) is essential, who are never the patients themselves but the clinicians whom patients trust as custodians of their welfare. Thus, enhancing or regaining public trust will not in itself enhance PM adoption rates, which has important policy implications.

3.1.3 *Output 2: Communities and infrastructure building*

This report builds on analytical insights gained through long-term engagement with the Human Brain Project, in addition to a recent round of interviews with scientists and engineers in the HBP. The report seeks to address the following questions: How do small communities of collaborative practices grow and/or merge into large-scale, multicentric research and innovation communities? How are they supported, or hindered, by infrastructure? Interviews show that while the HBP research infrastructure was designed to facilitate collaboration between scientists within and outside of the Project, scientists have been collaborating using alternative means. While much of the literature on infrastructure focuses on 'top-down', formal infrastructural design, we pay attention to the informal, invisible infrastructural assemblage involved in large-scale interdisciplinary collaborations. Here, it is suggested that the formal infrastructure built to facilitate and structure collaboration within large scale interdisciplinary research projects can sometimes render the informal infrastructure and collaborations invisible. Scientists and engineers within the HBP were often engaging in collaborations that were not visible to the Project leadership, administration, and to the European Commission because they were not using the formal infrastructure built to support, and account for, these same collaborations.

Beyond State of the Art: In contrast to most social studies of research infrastructures, which focus on 'top-down' formal infrastructural design, this report pays attention to the informal, invisible infrastructural assemblage involved in large-scale interdisciplinary collaborations and adapt conceptualisations of formality/informality from urban and planning theory to analyse the tensions

³ Public version of document: https://wiki.ebrains.eu/bin/download/Collabs/hbp-sga2-sp12-documents-for-the-m24-revi/WebHome/hbpforesightlab_2019_neurodiagnostics_briefingreport_public.pdf

⁴ <https://politybooks.com/bookdetail/?isbn=9780745689111>

between formal and informal infrastructures. The findings that formal infrastructures built to facilitate and structure collaboration within large scale interdisciplinary research initiatives can render informal infrastructuring and collaborations invisible has important implications for the governance and evaluation of such initiatives (see SGA2 Deliverable D12.1.1 (D75.1, D110)).

3.2 Validation and Impact

3.2.1 *Actual and Potential Use of Output(s)*

Output 1:

- Users: Psychiatrists, Clinical Researchers, Pharma, Health Policy Makers, Science Communities
- The Output has been input for the Ethics & Society Opinion on AI (SGA2 Deliverable D12.5.4 (D79.4, D51)). The opinion aims to clarify lessons the HBP can draw from the current discussion of artificial intelligence and in particular, the social and ethical aspects of AI, and outline areas where it could usefully contribute. As the opinion was finalised in the last stages of SGA2, any potential implementation of the Output in HBP will be done by WP9, during SGA3.

Output 2:

- Users: HBP Affiliates, External Researchers, Scientific Community, Policy Makers, Civil Society
- The report provides recommendations for the HBP leadership to maximise the success of the EBRAINS research infrastructure, especially in respect to the social infrastructure. These recommendations will be input for the Inclusive Community Building strategy in SGA3.

3.2.2 *Publications*

There are no peer-reviewed publications for these Outputs. For more information, we refer to the overview of publicly available Deliverables⁵ and the Ethics and Society Opinion on Responsible Dual Use⁶, the Opinion on Data Protection and Privacy⁷, and the forthcoming Opinion on AI (SGA2 Deliverable D12.5.4 (D79.4, D51)).

4. Key Result KR12.2

Conceptual clarification and analysis of two key notions within HBP research: consciousness and human identity, by using a neuroethical approach developed by our team.

4.1 Outputs

⁵ https://www.humanbrainproject.eu/en/about/governance/deliverables/sga2-phase/?edit_off=true

⁶ https://sos-ch-dk-2.exo.io/public-website-production/filer_public/77/61/7761fdcd-b0a0-40a2-a6bd-904d68d52b87/opinion_dual_use_hbp_ethicsociety.pdf

⁷ https://sos-ch-dk-2.exo.io/public-website-production/filer_public/24/0e/240e2eaa-8a10-4a17-87bc-b056a3f0cc8c/opinion_on_data_protection_and_privacy_done_01.pdf

4.1.1 Overview of Outputs

4.1.1.1 List of Outputs contributing to this KR

- Output 1: A theoretical model of consciousness and criteria for ascribing consciousness (T12.2.2) (C1935).
- Output 2: Proposal for a dynamic understanding of human identity that accounts for context and culture (T12.2.1) (C2341).
- Output 3: Fundamental Neuroethics as Methodology (T12.2.1, T12.2.2)

4.1.1.2 How Outputs relate to each other and the Key Result

These Outputs are importantly connected. Output 3 provides the methodology used to achieve Outputs 1 (model of consciousness) and 2 (dynamic understanding of human identity). In turn Outputs 2 and 3 illustrate the integration of conceptual analysis and neuroscientific research and practical translatability.

4.1.2 Output 1: A theoretical model of consciousness and criteria for ascribing consciousness

Consciousness studies are still affected by a sort of reciprocal mistrust and suspicion between philosophy and neuroscience. Furthermore, the tendency is to limit focus on aware brain operations, strongly opposed to the unaware ones.

We are currently focusing on the following topics:

- 1) Starting from a description of consciousness as a multimodal, situational survey of the surrounding world and body, sub serving complex decision-making and goal-directed behaviour, identification of criteria or indicators for ascribing consciousness, especially to animals and intelligent artefact (i.e. goal-directed behaviour and model-based learning; anatomic and physiological substrates for generating integrative multimodal representations; psychometrics and meta-cognition; episodic memory; susceptibility to illusions and multistable perception; specific visuospatial behaviours). Publications: P2013⁸, P2342⁹, P2044¹⁰. Results have also been shared through various dissemination activities including classes, keynotes, talks and presentations.
- 2) Investigation of the conceptual and technical plausibility of simulating through large-scale brain simulation and its possible clinical impact particularly on the assessment and care of disorders of consciousness (DOCs), e.g. Coma, Vegetative state/Unresponsive Wakefulness Syndrome (VS/UWS), minimally conscious state (MCS). For more information please see P1477¹¹ and press release on Michele FARISCO's PhD thesis¹².
- 3) Examination of the hypothesis that addiction is the result of both neuronal/neurochemical factors and external factors (e.g. socio-economic status) through epigenetic processes. On the basis of this hypothesis, we have argued for a collective, socio-political form of responsibility for preventing and managing drug addiction, if not in terms of liability at least in terms of policies.

⁸ Pennartz et al. 2019 <https://www.frontiersin.org/articles/10.3389/fnsys.2019.00025/full>

⁹ Michele Farisco 2019 <http://uu.diva-portal.org/smash/get/diva2:1347252/FULLTEXT01.pdf>

¹⁰ Northoff et al. 2019 <https://www.sciencedirect.com/science/article/pii/S0149763419302325?via%3DiHub>

¹¹ Farisco et al. 2018 <http://dx.doi.org/10.3389/fpsyg.2018.00585>

¹² <https://www.uu.se/en/news-media/press-releases/press-release/?id=4880&typ=pm&lang=en>

For more information: P1827¹³. Results were also shared in the Ethics Blog¹⁴, HBP Newsletter¹⁵ and during 2nd HBP Curriculum Workshop on ethics, research and societal impact workshop - Dual use and Responsible Research: Ethical challenges (2018)).

- 4) Conceptual clarification of intelligence (natural and artificial) as a preliminary condition to undertake ethical reflection on the ethical issues raised by AI and to suggest a criterion for a comprehensive ethical analysis of AI, namely regardless of the presence of intelligence, the lack of morally relevant features disqualifies AI from performing certain human activities Outcome: article "Towards establishing criteria for the ethical analysis of AI", Science and Engineering Ethics (*in press*). Results has also been shared through presentations at conferences including a Higher research seminar at the Centre for Research Ethics & Bioethics (Uppsala University, 2019, October 18th).

4.1.3 *Output 2: Proposal for a dynamic understanding of human identity that accounts for context and culture*

One explicit goal of the HBP research is furthering our understanding of humanness. This topic is not just important in itself but proves key in addressing a host of other issues, including the ontological and moral status of artificial intelligences and the impact of neurotechnology on what makes us human. The group is employing a dynamic understanding of human identity according to which human identity is best understood as a three-dimensional interaction between a particular genetic make-up, a prolonged period of physical brain development, and the rich socio-cultural-symbolic environments where humans develop. At present, we are using this approach to address the following:

- 1) The role of neuroscience in enhancing our knowledge of what we are. While rejecting brainhood, that is, the view that humans are completely explained by their brains, we argue that neuroscience plays a unique role in unveiling important aspects of what being human is and that neuroscience's contribution can be used in order to identify and address a number of important ethical issues, including potential impact of neurotechnologies on what we are (SGA2 Deliverable D12.2.1 (D76.1, D111)). Results has also been shared in workshops, Keynotes and presentations.
- 2) To what extent the attribution of a human identity or even allegedly human-like traits plays a role in the discussion of a number of technologies and the impact of research in robotics and AI (P2506)¹⁶.

Following our neuroethical methodological approach (see Output 3) we continue to emphasise the need for a careful examination of the relevant concepts in order to identify and manage the ethical issues raised by the research.

4.1.4 *Output 3: Fundamental Neuroethics as Methodology*

Neuroethics is a key concern of the International Brain Initiative¹⁷ and the brain initiatives are actively integrating neuroethics into their projects. We have participated in efforts to promote such integration (see Rommelfanger *et al* (2018) - P1476¹⁸). While in the past there has been a tendency within the brain initiatives to reduce neuroethics to a type of applied ethics, the HBP's leadership in the development of a broader conception and practice of the field is making a significant impact in the international discussion of the ethical issues raised by brain science. Fundamental neuroethics,

¹³ Farisco et al. 2018 <http://dx.doi.org/10.3389/fpsy.2018.00595>

¹⁴ <https://ethicsblog.crb.uu.se/2018/12/04/drug-addiction-as-a-mental-and-social-disorder/>

¹⁵ <https://www.humanbrainproject.eu/en/follow-hbp/news/neuroscience-of-drug-addiction-highlights-policy-ethical-issues/>

¹⁶ Salles et al. 2020 <http://dx.doi.org/10.1080/21507740.2020.1740350>

¹⁷ <https://www.brainalliance.org.au/learn/media-releases/worlds-brain-initiatives-move-forward-together/>

¹⁸ <http://dx.doi.org/10.1016/j.neuron.2018.09.021>

a methodological approach developed by the HBP's neuroethics and philosophy group, carries out conceptual analyses of foundational notions (concepts and methods) of neuroscience to provide the necessary background in examining the potential impact of neuroscience on topics such as the mind/brain relationship, and criteria for consciousness, among others. This entails not just enriching but going beyond a discussion of practical issues.

During SGA2 we have used our methodological approach in our research on consciousness, human identity, and AI research's impact on society. We published a number of papers on this topic in high impact journals (P1468¹⁹, P1929²⁰, P1665²¹, P1476²², and actively disseminated the methodology in a number of forums including the Ethics Blog²³ at the Global Neuroethics Summit 2019 (September 24, 2019 - Daegu, South Korea) and at the HBP Curriculum Workshop: Neuroscience, Robotics, AI and Medical Informatics: New insights with diversity & ethics (2019, September 26th). In particular, we have used this approach in our contribution to SP12 Opinion 3 on Trustworthy AI (SGA2 Deliverable D12.5.4 (D79.4, D51)), offering a comprehensive conceptual analysis of the notions of trustworthiness, trust and transparency, key aspects in the recent discussion on responsible AI.

4.2 Validation and Impact

4.2.1 *Actual and Potential Use of Output(s)*

Output 1:

- Users: researchers (in biological sciences and the humanities), students, academics, health care professionals
- This Output has been used as input for collaboration with SP3 and SP6 (specifically for research on patients with Disorders of Consciousness (DOCs) and criteria for ascribing consciousness, and for simulation of cognitive brain dynamics respectively) during SGA2 and will continue to be used as input for work in WP2 during SGA3.

Output 2:

- Users: HBP Researchers, External Researchers, Scientific Community, Policy Makers, Civil Society
- This Output has been used as input for the Ethics and Society Opinion on AI and will be used as input for work for SGA3 Tasks T1.9 Neuroethics, cultural impact on brain architecture, T3.8 Ethics and Philosophy of AI and bio inspired modelling and T4.14 community building

Output 3:

- Users: HBP Researchers, External Researchers, Scientific Community, Policy Makers, Civil Society
- This Output has been used as input in collaboration with SP3 and SP6 (for joint research on patients with DOCs and criteria for consciousness, and brain simulation respectively), and in the Dual Use and Artificial Intelligence Opinions, and it has also been used in collaboration with the International Brain Initiative (IBI). This Output will continue to be used as input for work in all the neuroethics SAG3 Tasks and for Task T4.14 Inclusive Community Building in SGA3

The following is a summary of key impacts of our work in neuroethics and philosophy in the HBP.

Academic: Altimetric indicators (used to determine the amount of attention received by an article) of our publications (from 15 to 70 in some cases), downloads and views from Open Access Repositories (more than 5,000), and citations (more than 15) make evident that our research has received significant attention from researchers from different disciplines within and without the HBP. Of particular interest is our research on consciousness (topics that our team continues to

19 Salles et al. 2018 <https://doi.org/10.1007/s12152-018-9372-9>

20 Salles et al. 2019 <https://www.tandfonline.com/doi/full/10.1080/21507740.2019.1632972>

21 Salles et al. 2019 <http://dx.doi.org/10.1016/j.neuron.2019.01.005>

22 Rommelfanger et al. 2018 <http://dx.doi.org/10.1016/j.neuron.2018.09.021>

23 <https://ethicsblog.crb.uu.se/2019/05/15/neuroethical-reflection-in-the-human-brain-project/>

examine jointly with HBP neuroscientists) and our conceptual methodology that has been widely discussed in a number of international venues.

Our research articles on conceptual neuroethics, emphasising the importance of philosophical analysis in the examination of the issues raised by neuroscience have had significant impact on the international debate particularly with the different international brain initiatives.

Societal: Our main work consists in the identification and conceptual examination of the relevant neuroscientific and philosophical concepts and such work is intended to further society's understanding and management of the social, ethical, philosophical issues raised by neuroscientific research. The impact of such work on society at large can be measured by media coverage, requests for media appearances (interviews) and engagement with different publics.

Policy: Our work is relevant to policy making, particularly regarding issues such as the ethics of disorders of consciousness, the ethics of drug addiction, or how to develop a framework for ethically sound AI. The impact of our work on policy making could be measured in terms of the extent to which it is cited in governmental documents and reports, or results in reports that can be used by the appropriate bodies. Since our work in the past has been used as such (for example, *Opinion on Data Protection and Privacy*²⁴ and *Opinion on Responsible Dual Use*²⁵ and forthcoming *Opinion on AI* (SGA2 Deliverable D12.5.4 (D79.4, D51)) we expect our current research on consciousness, human identity and AI to be similarly used.

4.2.2 Publications

- P2013 Pennartz, C, Evers K, Farisco, M. (2019) Indicators and criteria of consciousness in animals and intelligent machines: an inside-out approach. *Frontiers in Systems Neuroscience*. 25 doi: 10.3389/fnsys.2019.00025. Output: #1 This peer-reviewed article offers a combination of empirical and conceptual analyses for an operationalisation of consciousness aimed at detecting it in challenging cases like non communicative patients, other animals and AI.
- P1468 Salles A, Evers K, Farisco M. (2019) Neuroethics and Philosophy in Responsible Research and Innovation: The Case of the Human Brain Project. *Neuroethics*. (12) 201-211 <https://link.springer.com/article/10.1007/s12152-018-9372-9> Output: #2, #3 This peer-reviewed article explains the HBP's neuroethics contribution to the RRI framework, with an emphasis on the key role played by philosophical and conceptual reflection in shaping the scientific agenda.
- P1665 Salles A. Bjaalie J. Evers K. Farisco M. Fothergill T. Guerrero M. Maslen H. Muller J. Prescott T. Stahl B C. Walter H. Zilles K. Amunts K. (2019) The Human Brain Project: Responsible Brain Research for the Benefit of Society. *Neuron* 101:3 DOI <https://doi.org/10.1016/j.neuron.2019.01.005>. Neuron Special Issue on Neuroethics, Output: #1, #2, #3 This peer-reviewed paper describes HBP's neuroethics work and ethics infrastructure, pointing to distinctive features and achievements

5. Key Result KR12.3

In SGA2, the key results of the stakeholder and public engagement task of the HBP, will be a report collating results of public and stakeholder engagement on clinical, social and ethical implications of simulation. The report is input for the third SP12 Opinion (D12.5.4) (SGA2-SP12-UC001).

²⁴ https://sos-ch-dk-2.exo.io/public-website-production/filer_public/24/0e/240e2eaa-8a10-4a17-87bc-b056a3f0cc8c/opinion_on_data_protection_and_privacy_done_01.pdf

²⁵ https://sos-ch-dk-2.exo.io/public-website-production/filer_public/77/61/7761fdcd-b0a0-40a2-a6bd-904d68d52b87/opinion_dual_use_hbp_ethicsociety.pdf

5.1 Outputs

5.1.1 Overview of Outputs

List of Outputs contributing to this KR

- Output 1: “360 Methodology” (T12.3.2)
- Output 2: Overview and assessment of severity of societal challenges posed by AI along with recommendations for how to handle them (T12.3.2) (C1890, C2654).
- Output 3: Insight into Europeans’ informed and considered views on Artificial Intelligence - Results from EuropeSay on AI (T12.3.1) (C2334), (SGA2 D12.3.1)
- Output 4: “GlobalSay Methodology” (T12.3.1)
- Output 5.: Overview of public engagement activities and potential for collaboration on neuroethical issues in global collaboration (T12.3.1, T12.3.2) (C2333)
- Output 6: Lessons on community engagement (T12.3.2), (SGA2 D12.3.1)

5.1.1.1 How Outputs relate to each other and the Key Result

Output 1 is a method developed from the work of Output 2. In the same way Output 4 is a method developed from work of Output 3. Information from Output 2 has been used in the report created in Output 6. Output 5 is not related to the other Outputs but is related to the Key Result’s focus on public engagement.

5.1.2 Output 1: 360 Methodology

The AI 360tool²⁶ is an online tool designed for the AI 360 workshop. The online tool is developed by the Public Dialogue and Engagement Task T12.3.2 and is a further development of the DESSI tool (Decision support tool on security investment)²⁷. The tool supports a multicriteria and multi-dimensional assessment of AI and its future implications. It allows for a ranking and overview of severity of impact, and for experts to jointly develop and rate solutions for their applicability to help solve the issues identified in the assessment. The tool was used at the AI 360 workshop (See Output 2 and the AI 360 Report²⁸).

5.1.3 Output 2: Overview and assessment of severity of societal challenges posed by AI along with recommendations for how to handle them

The report²⁸ presents the results of the AI 360 COPENHAGEN workshop. The workshop gathered recognised experts in rights and ethics, law, social science, culture, politics and economy. The report presents an overview of ethical and societal issues across: policy; legal framework, rights and ethics; economy; societal implications, and it presents recommendations for how to increase the likelihood of steering AI towards societal benefits. However, even if the recommendations from the experts were to be followed some concerns remained. This included solutions for dealing with inequality in the distribution of benefits and risks that would follow from an increased implementation of AI in

²⁶ <https://360tool.eu/en/>

²⁷ <https://tekno.dk/project/dessi-decision-support-on-security-investments/?lang=en>

²⁸ http://hbp.tekno.dk/wp-content/uploads/2019/01/AI360_HumanBrainProject_Recommendations_report-1.pdf

our societies. In addition, concerns remained on the potential of AI for abusive applications affecting fundamental rights and freedoms and the functioning of democratic societies.

The AI360 workshop was a multidimensional and multi-criterial process that addressed what seems to be lacking in the popular debate about AI and took the report to an action-oriented level, rid of lofty visions of far-fetched futures. The report can be found [here](#)²⁸.

5.1.4 Output 3: Insight into Europeans' informed and considered views on Artificial Intelligence - Results from EuropeSay on AI

Engagement of over 900 citizens in 13 countries, across 156 events, making up the first effort to collect comparable information about what citizens across Europe think about artificial intelligence, by organising European-wide citizen engagement, and thus also provides a first valuable indication of how European citizens as a whole perceive artificial intelligence (See SGA2 Deliverable D12.3.1 (D77.1, D112)).

5.1.5 Output 4: GlobalSay Methodology

The consultation EuropeSay on AI made use of the novel citizen engagement methodology GlobalSay, developed by HBP's Public Engagement and Dialogue group in SP12. The methodology is designed to allow people freedom in terms of time and place of engagement. Participants set up their own meetings with whom they want to and make use of an online platform that guides them through the meeting. The methodology combines providing easily accessible information material with group deliberations and individual voting. Read more about how it was used [here](#)²⁹ and in SGA2 Deliverable D12.3.1 (D77.1, D112).

The GlobalSay methodology is a novel methodology for engaging citizens using advanced digital tools, allowing citizens to participate at a time and place of their convenience, while at the same time producing considered and informed output.

5.1.6 Output 5: Overview of public engagement activities and potential for collaboration on neuroethical issues in global collaboration

During collaboration with the International Brain Initiative's Neuroethics working group, we explored the attitudes and activities to public engagement on neuroethical issues among the World's Brain Projects.

International collaboration on neuroethics and combined with public engagement is a unique opportunity (scale, and not done before) for advancing neuroscience, neuroethics and public engagement to mutual benefits and the advancement of science. The Ethics and Society group were co-organisers to a Pre-Summit Workshop prior to the Global Neuroethics Summit that was held in Uppsala, May 2019, more information on the workshop can be found [here](#)³⁰. They were also co-organisers to the Global Neuroethics Workshop 2019, program and agenda can be found [here](#)³¹.

²⁹ <https://tekno.dk/article/eusay-ai/?lang=en>

³⁰ http://hbp.tekno.dk/wp-content/uploads/2019/05/Background-Packet_Uppsala-Neuroethics-Workshop_May-2019_email-version-1.pdf

³¹ <https://globalneuroethicssummit.com/program-agenda/>

5.1.7 *Output 6: Lessons on community engagement*

The 2nd Report SP12-SGA2: Lessons from stakeholder engagement and dialogue (Deliverable D12.3.2 (D77.2, D113)) collects up on the stakeholder and public engagement activities of the Danish Board of Technology Foundation since the ramp-up phase. It shows the main topics, collects up on themes and findings and sets out the main lines of activities in SGA3. Overall, we have worked with four main themes: data protection and privacy, potential political, security, intelligence or military (PSIM) uses or research, artificial intelligence (AI), and inclusive community building.

Strategic implementation of Open Research Agenda Setting (ORAS) strategies from the beginning of SGA3 could have significant influence on the HBP's ability to broaden the user communities for EBRAINS. ORAS in the EBRAINS Community serves several purposes, including to help increase research excellence by making optimal use of the facilities in EBRAINS; facilitate the collaborative development of research topics between infrastructure experts and other scientists and to increase the societal value of and benefits from EBRAINS related R&I. ORAS will be implemented in the SGA3 Inclusive Community Building strategy which is currently being developed.

5.2 Validation and Impact

5.2.1 *Actual and Potential Use of Output(s)*

Output 1: “360 Methodology” (T12.3.2)

- Users: Researchers, policy makers
- The method can be developed to support a multicriteria and multi-dimensional assessment of other technologies and its future implications.

Output 2:

- Users: General public, policy makers, researchers

The Output will be used for further work in engagement on AI during SGA3. The Output has been input for the Ethics & Society Opinion on AI. The opinion aims to clarify lessons the HBP can draw from the current discussion of artificial intelligence and in particular, the social and ethical aspects of AI, and outline areas where it could usefully contribute. Output 3:

- Users: General public, policy makers, researchers
- Citizen engagement helps create informed awareness amongst citizens. Furthermore, the results of this Output are important for RRI and will benefit society, to inform researchers on the public views on emerging science such as AI.

Output 4:

- Users: Researchers, policy makers
- The method developed can be used in other contexts to create international citizen engagement. The method will be further developed and used in SGA3.

Output 5:

- Users: Researchers, policy makers
- In SGA3, international collaboration on neuroethics, combined with public engagement, will be carried out by Task T9.3 “Neuroethics and engagement” in collaboration with the International Brain Initiative. Joint work will facilitate advancement of neuroscience, neuroethics and public engagement to mutual benefits and the advancement of science.

Output 6:

- Users: Researchers, policy makers
- This Output summarises learnings from more than six years of stakeholder engagement in relation to the HBP. Learnings have been important to inform HBP leadership on stakeholder views and will continue to be useful for the future work on stakeholder engagement and community building in SGA3. This also complements KR12.1 Output 2.

5.2.2 *Publications*

No scientific publications have been made for this Key Result. For dissemination activities we refer to the Ethics & Society’s SGA2-SP12 Communication reporting (D12.5.3 (D79.3, D50)).

6. Key Result KR12.4

Creation and maintenance of a public-facing Ethics Support blog, hosted on the Orbit system (Observatory for Responsible Research and Innovation in ICT), which will feature regular, accessible commentary on current developments in neuroscience and computing from a Responsible Research and Innovation perspective. In addition, it will link to Ethics training materials and support the development of strategic links within and outside of the HBP.

6.1 Outputs

6.1.1 Overview of Outputs

6.1.1.1 List of Outputs contributing to this KR

- **Output 1:** Ethics Dialogues blog <https://www.ethicsdialogues.eu/> (MS 12.4.8.) (T12.4.1; T12.4.2; T12.4.3; T12.4.4; T12.4.5; T12.4.6; T12.4.7)
- **Output 12.4.2:** Data Policy Manual (DPM), (D12.4.1 (D78.1, D114)). (T12.4.1, T12.4.2, T12.4.3, T12.4.4, T12.4.5, T12.4.6, T12.4.7)

6.1.1.2 How Outputs relate to each other and the Key Result

Output 1 is the Ethics Dialogues blog, which has been active throughout the project period. Output 2, the DPM, has been implemented as the primary source of data governance, data protection and data management for researchers, administrators and project managers across the HBP and is essential ethics support.

6.1.2 Output 1: Ethics Dialogues blog

Building on its work during RUP and SGA1, the Ethics Support Work Package is conceptually and practically advancing a novel, dialogical approach to ethics governance. In March 2019, a collaborative paper outlining dialogical approach to ethics governance has been published (Stahl *et al*, *Frontiers in Human Neuroscience*, 2019 (P1858)). This approach is disseminated through our Ethics Dialogues blog <https://www.ethicsdialogues.eu/>. Since the launch of the blog in October 2018, more than 40 posts have been published which facilitate dialogues on all our tasks and activity areas including compliance, support to Ethics Advisory Board and Ethics Rapporteurs, ethics-related data governance, data protection, Artificial Intelligence and dual use. Many Ethics Support team members, our collaborators within and beyond the HBP and young researchers have contributed to this blog.

Dialogical approach provides an alternative to current research ethics practice, which is based on ethics reviews by institutional review boards (IRB) and underpinned by ethical principlism. Innovative approach developed in the Work Package is based on discourse ethics, which implements responsible research and innovation through dialogues. Ethics dialogues approach allows a broader view encompassing established ethics procedures but remaining open to additional influences. In the case of the HBP, dialogical approach provides a practical way of dealing appropriately with ethical issues in complex and multidisciplinary large-scale technology-enabled project. This approach can help to develop good practice for other projects.

6.1.3 Output 2: Data Policy Manual (DPM)

As a world-leading project, the HBP has the ambition to be at the forefront of questions of international collaboration in ICT and neuroscience and to develop standards in the use and exchange

of data. This Data Policy Manual (DPM)³² expresses the policies that the HBP has developed to realise these ambitions.

The DPM has been implemented as the primary source of data governance, data protection and data management for researchers, administrators and project managers across the HBP. A single document which encompasses the data policy requirements of a project as complex and multi-faceted as the HBP goes beyond state of the art.

6.2 Validation and Impact

6.2.1 *Actual and Potential Use of Output(s)*

Output 1: Ethics Dialogues blog <https://www.ethicsdialogues.eu/> (MS 12.4.8.) (T12.4.1; T12.4.2; T12.4.3; T12.4.4; T12.4.5; T12.4.6; T12.4.7)

- Users: The blog is aiming to disseminate our ethics and RRI practices to a broad range of audiences within and beyond the Human Brain Project including researchers, research managers and policymakers. By early March 2020, the blog has approximately 3,500 users and more than 9,000-page views. In particular, it has active users in the UK, US, Germany, Sweden, Nigeria, Greece, France, the Netherlands, India and Switzerland.
- The blog aims to contribute to all other SPs by raising their awareness about societal and ethical issues of neuroscience, computing and Artificial Intelligence. This is done by providing accessible blog posts, informative and engaging content and pointers to relevant information and documents. More specifically, the blog reflects on cross-SP collaborations (e.g. joined SP12 and SP10 workshop on social and ethical aspects of Neurorobotics, Project wide working groups and HBP Education events) as well as contributions from other SPs (e.g. on gender from SP11 and on Ethics Rapporteurs from SP7).

Output 2: Data Policy Manual (DPM), (D12.4.1 (D78.1, D114)). (T12.4.1, T12.4.2, T12.4.3, T12.4.4, T12.4.5, T12.4.6, T12.4.7)

- Users: scientists, technologists, research administrators and managers both within the HBP and in the field of science in general
- The DPM is a document which details data-related policies which are relevant across the entire Project. The DPM, therefore, contributes to each SP in terms of guiding and advising on data governance, protection and management.

6.2.2 *Publications*

- P1857 Stahl, B., Akintoye, S., Fothergill, B.T., Guerrero, M., Knight, W. and Ulnicane, I. (2019) Beyond research ethics: Dialogues in Neuro-ICT Research. *Frontiers in Human Neuroscience*. DOI: 10.3389/fnhum.2019.00105 P1857
 - This paper details the ethics dialogues approach implemented in HBP Ethics Support (WP12.4), the Ethics Dialogues blog is an example of this approach in action. Output: #1
- P1858 Fothergill BT, Knight W, Stahl BC and Ulnicane I (2019) Responsible Data Governance of Neuroscience Big Data. *Front. Neuroinform.* 13:28. doi: 10.3389/fninf.2019.00028
 - This paper details the data governance concerns associated with large neuroscientific research projects, and uses the HBP data governance processes and responsibilities. The Data Policy Manual is a key part of data governance in the HBP. Output: #2

³² https://sos-ch-dk-2.exo.io/public-website-production/filer_public/88/06/880677aa-5670-42ef-8b4c-fbdaac27bdd5/hbp_dpm_20191105.pdf

7. Conclusion and Outlook

During the last two years of the HBP Project, the Ethics & Society group has been involved in more than 200 dissemination activities, including self- and co-organised workshops and conferences, the production of webinars, blogs and newsletters, and given a large number of keynote speeches, talks, presentations and lectures. The Ethics and Society group is an inspiration to other Brain Projects worldwide and its academic articles are well received. A Scientific Brochure with the collected overview of SP12 peer-reviewed publications and reports will be published in 2020.

The group has helped organise the first large international conference of the HBP: “Understanding Consciousness: a scientific quest for the 21st century”, 21-22 June 2018 in Barcelona. The conference was hugely successful in collecting a disciplinary diverse world-leading group of researchers in two days of intense debate. In addition to providing new insights and understanding, the conference helped increase the visibility of HBP internationally and promote scholarly debate.

The group has also been co-organiser and consultant on neuroethics and engagement at the Global Neuroethics Summit 2019 (September 24, 2019 - Daegu, South Korea). The Summit pursued varying strategies for addressing the societal and ethical implications of emerging neuroscience and neurotechnologies. As neuroscience is now a global endeavour, neuroethics must be equally prepared to address global values.

For the period April 2019 to March 2020, the group has delivered conclusions to the work in SGA2 and prepared for the work that will be done in the RRI Work Package in the last period of HBP, SGA3 (planned for April 2020 - April 2023).

The group continues to involve HBP researchers and leadership into its ‘machine room’, whilst developing concepts for events, opinions, working groups and for gaining insight for Project outputs. Therefore, representatives of other main research clusters in the HBP are members of the HBP Working Group on Dual Use. The establishment of the working group was led by Ethics and Society to follow-up on recommendations from our Opinion on Responsible Dual Use.

Another highlight includes the submission of the Ethics & Society’s Opinion on AI, to which all the groups in Ethics & Society have contributed. The opinion aims to clarify lessons the HBP can draw from the current discussion of artificial intelligence, in particular the social and ethical aspects of AI, and outline areas where it could usefully contribute. The Opinion will be made public in 2020.

In the next (and last) phase of the Human Brain Project, the group will continue its work in the RRI Work Package. Here, the group will ensure responsible research and innovation both in the continued scientific work and in the establishment and development of the EBRAINS research infrastructure. The stakeholder engagement of the earlier phases of HBP has been integrated into the Inclusive EBRAINS Community building activities in SGA3, and close collaboration will continue.

The future work will be directed at increasing collaboration, understanding, implementation and capacity-building on RRI in: HBP, EBRAINS, international brain projects, and increasing engagement and uptake of societal input for the development of EBRAINS.