

Issues Paper

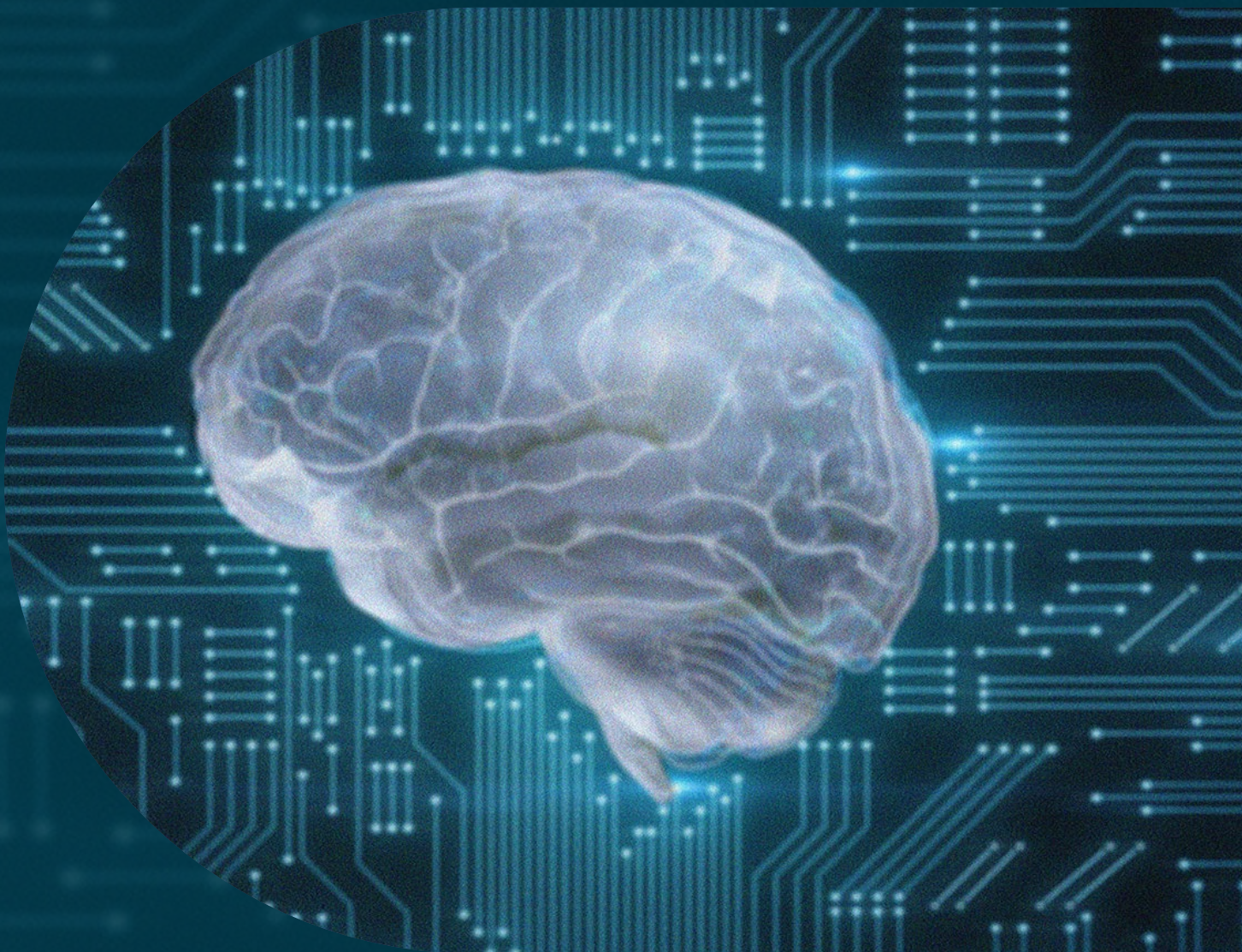
HELP in
Neurotechnology
with Dr Allan McCay



synchron

the imperative considerations Human Rights, Ethics, Law and Policy

17 May 2023



Official Event Host



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The important discussions that began at the first Australian neurotech forum and now continue after the second, *HELP In Neurotechnology*, are now beginning to have ripples outside the event.

Following on from a talk at the first event by the President of the Human Rights Commission, Emeritus Professor Rosalind Croucher, a speaker at the second was Lorraine Finlay who is the Australian Human Rights Commissioner. The participation of these two speakers was significant and now neurotechnology appears on the Commission's website and is stated to be one of the commissions "key priorities".

Also, since the second forum the Australian Journal of Human Rights has published one of my own papers which is the first to focus on Australia's preparedness to meet the human rights challenges of neurotechnology. This demonstrates an interest in the topic in the Australian academic community. However, the legal challenges of neurotechnology go well beyond human rights and in that paper I suggested that the Attorney General might request that the Australian Law Reform Commission examine the issues relating to neurotechnology.

A need for different parts of government to consider neurotechnology was made clear by Dr Robert McCombe from the UK's Information Commissioner's Office (ICO). Dr McCombe talked about the ICO's then imminent report on neurotechnology. Since the most recent event, this report has now been published and it will be interesting to see whether this UK document leads to action in Australia.

The increasing global significance of the ethical issues surrounding neurotechnology is evident from an event that (at the time of writing) is about to be hosted by UNESCO in Paris. This forum includes speakers including the Secretary-General of the UN, the Prime Minister of India, the Prime Minister of Spain, the President of Chile and one of the speakers from the first forum, ethicist Associate Professor Frederic Gilbert from the University of Tasmania, as well as other speakers who I have co-authored with.

Increasing interest in the human rights, ethical, legal and policy (*HELP*) dimensions to neurotechnology is now clear. It is vital that Australia responds appropriately to the challenges and it was great to participate in the *The HELP In Neurotechnology Forum*. It is important that the Australian conversation continues and leads to action.

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Author of the Law Society of England and Wales report

Neurotechnology, law and the legal profession (August 2022)



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Professor Michael Witbrock
Director, NAOInstitute,
Faculty of Science, University of Auckland
CEO, TransAxon Limited



Professor Nicholas Opie
Co-founder and CTO of Synchron, Inc



Emeritus Professor Jeffrey Rosenfeld AC, OBE
Internationally recognised neurosurgeon and
one of Australia's leading academic neurosurgeons



Lorraine Finlay
Australian Human Rights Commissioner



Stephanie Herrmann
International Human Rights Lawyer,
Perseus Strategies, LLC



Dr Rob McCombe
Principal Policy Advisor, Emerging Technology,
Information Commissioner's Office, United Kingdom



Drew Pearson
Partner, Employment and Industrial Relations,
Herbert Smith Freehills



Dr Kate Harrington
Head of Strategic Digital Initiatives,
NSW Department of Customer Service



Stephen Scheeler
Chief Executive Officer, Omniscient
Former CEO, Facebook ANZ

Introduction

Neurotechnology has rapidly emerged as one of the most promising and challenging fields of technological innovation – one which demands immediate examination and regulatory response.

It offers solutions to a range of mental illness and the ability to return senses and motor control to people with disabilities, but it also presents significant threats to privacy, and creates opportunities for new forms of coercion.

While the true potential of neurotechnology is unforeseeable, what is clear is that the decisions that are taken today – or that fail to be taken today – will have profound impacts on the development of neurotechnology and how it is applied – impacts that will be felt for many decades.

When it comes to neurotechnology's ability to both read and influence the activity of brain, the genie is now truly out of the bottle. For instance, the Harvard Business Review reports that more than 5000 companies globally are using neurotechnology to measure human factors such as worker productivity and alertness, while the technology is also being marketed as an interrogation aid. Both use cases raise significant ethical questions.

And when coupled with accompanying rapid developments in the field of artificial intelligence (AI), the potential for neurotechnology to substantially affect society becomes greater still.

The speed at which neurotechnology is developing has significant ethical and legal implications which must be considered now if we are to have any hope of ensuring its development ultimately benefits society overall.

The challenges and opportunities of neurotechnology were the core focus of a second neurotechnology forum organised by Jewelrock and held in Sydney in May 2023.

This forum brought together practitioners and experts from the fields of neuroscience, medical research, the public sector, and the legal profession, along with numerous other interested parties to hear and discuss the latest developments.

This forum followed on from an event held in November 2022, which was prompted in part in response to the 2022 report, *Neurotechnology, law and the legal profession*, created by Dr Allan McCay, Deputy Director of The Sydney Institute of Criminology and an Academic Fellow at the University of Sydney's Law School.

As speakers at this second forum were quick to point out, all the developments in neurotechnology to date are only a foretaste of what is to come.





Neurotechnology and human rights

The forum commenced with a presentation by Australian Human Rights Commissioner Lorraine Finlay, who spoke of the speed at which new advances were occurring and the need to consider not only the enormous opportunities ahead but also the consequences and risks.

“It is important that we think about those things from the very beginning, so that we can hopefully put the guardrails and safety mechanisms in place to ensure that we harness the benefits whilst avoiding some of the harms and risks that might develop,” Finlay said.

She described the current state of the law relating to neurotechnology and generative AI in both Australia and abroad as profoundly inadequate, with little legislative consideration having taken place regarding the significant impacts these technologies would have for laws across many realms, including those pertaining to human rights.

“What we are really doing is taking a human rights framework that was developed in the aftermath of World War II and trying to extend it to technologies that, at the time that framework was established, were the province of science fiction,” she said.

Finlay said accommodating neurotechnology may require the extension of traditional notions of human rights, or even the creation of entirely new human rights. Either process would also require recognition and definition of concepts such as cognitive liberty, mental privacy, and provision of equal access to mental augmentation.

While some of these rights could be extrapolated from existing covenants and treaties, concepts such as the right to control of a person’s consciousness and electrochemical thought processes were less defined, despite being linked fundamentally to our identities as human beings.

Finlay cited the ongoing challenge to privacy that already existed thanks to the analysis of clickstream data, and said this would be heightened by neurotechnology devices that could read people’s brain activity.

“Neurotechnologies allow the harvesting of the most sensitive personal information – our thoughts and feelings,” Finlay said. “To have this information traded as a commodity is abhorrent and it needs to be addressed. The traditional right to privacy does not go far enough in this context, and so we need to start talking about rights to mental privacy.”

Finlay said Australia had an opportunity to become a leader in the consideration of neurotechnology within human rights frameworks, and she called

on all interested parties to make submissions to the Parliamentary Joint Committee on Human Rights, which was currently conducting an inquiry into Australia’s Human Rights Framework.

“I’m concerned that without express consideration being given to these issues, the technology will simply develop ahead of the law, and we won’t be able to catch up,” she said. “But I am also very aware that law reform is a slow process, and a considered process, and so we need to be thinking about what else we can do now, rather than simply stepping back and waiting for law reform to take its course.”

“Australia can lead the way on this issue, and the Australian Human Rights Commission wants to be part of that drive.”

Finlay said the Commission was developing a centrepiece project relating to neurotechnology and human rights, by bringing together an expert steering committee to produce a report and recommendations for legislative reform, and by producing a submission to the United Nations’ Human Rights Council on neurotechnology and human rights.

“Australia is at a key juncture in relation to technology and human rights generally, and in neurotechnology in particular,” she said. “We can become world leaders and advocate for neurorights in the 21st century, but if we lose this opportunity, we may not have the chance to meaningfully protect human rights in respect to neurotechnology until it is too late.”





Rapid technological progression

Finlay's presentation was followed by a panel discussion which commenced with an address by the internationally recognised Australian neurosurgeon Professor Jeffrey Rosenfeld AC OBE, whose work involves cranial procedures to implant electrodes into the brain in support of efforts to create a bionic vision device to restore sight in blind people.

Prof Rosenfeld spoke of recent developments in neurotechnology, including one experiment where MRI technology was used to interpret when a subject was thinking about a specific scene.

"It wasn't perfectly accurate, but it was the start of things to come, where thoughts can be read in a scanner," Prof Rosenfeld said.

He then described the rapid evolution of different techniques for gathering and influencing neuro data, starting with the use of electrodes on the scalp to detect electrical brain activity. He noted that while this technique was widely used, it presented difficulties for accurately detecting relevant brain signals.

Better results could be gained from placing the sensing electrodes within the skull itself, with this technique having proven highly effective when interpreting signals from the areas of the brain responsible for moving the tongue and mouth and throat. This data could then be used to translate brain signals into speech in people who were non-verbal, with similar techniques also useful for activating paralysed muscles or robotic limbs.

Prof Rosenfeld also described how technology developed by the neurotechnology company Synchron inserted fine electrodes close to the brain by passing them through the venous system, creating methods for high resolution sensing without the need for invasive cranial surgery.

He also described a longer-term vision for the creation of a 'neural dust' which would introduce nanotechnology-scale electrical sensors or stimulators into the body using the circulatory system, and then be steered to different parts of the brain using magnets.

"Scientists are trying to do that experimentally in animals, so how long is it going to be before we try to do that in humans?" he asked.

Prof Rosenfeld was joined in the discussion by Stephen Scheeler, chief executive of Omniscient Neurotechnology, a company which combined neuroscience and AI to create detailed maps of the connections in the brain.

Scheeler said neurotechnology companies such as his and others that were associated with medical procedures were already subject to a very robust regulatory frameworks, and that concepts such as informed consent and data privacy were taken very seriously. However, he said this was not the case for vast bulk consumer-grade and therapeutic neurotechnology devices which gathered signals from outside of the skull.

"We have already had the wild west of personal data, and now we have the wild west of brain data, and we are very concerned about this because we do want to have the right guidelines out there," Scheeler said. "What you don't want to have happen for any organisation is to have a mishmash of regulation that is constantly changing and is different in different places."

Privacy and brain data

The panel was also joined by Dr Rob McCombe, the principal policy advisor for emerging technology at the UK Information Commissioner's Office (ICO). Dr McCombe discussed the need for greater education regarding the complexities of neurotechnology, and specifically its implications for privacy, and the need to ensure transparency, fairness, and accountability from the very beginning of the technology's development.

Dr McCombe agreed that the collection and processing of people's neurodata posed significant and specific risks to people's rights, especially given the intrinsic and involuntary nature of subconsciously generated neurodata, and the potential for large-scale data sets to be used to draw inferences relating to sensitive considerations such as a person's mental health.

He said examples already existed where organisations were monitoring human performance and behaviour using biometric techniques, and that these were now being enhanced using neurotechnology. Additional applications might also emerge in gaming and entertainment, by integrating augmented reality and virtual reality interfaces, while neuromarketing offered the potential for highly personalised advertising.

Dr McCombe said the UK government's response was to continue to use its principle-based regulatory framework which allowed flexibility as technologies emerged and evolved.

He said his team had also created 'snapshots' of different neurotechnologies that could help to further articulate the possibilities and privacy risks. These would be contained in a report on neurotechnology to be released in June 2023.

He warned however that new issues could arise from the misuse of neurodata, such as novel forms of discrimination, or decisions being made based on inaccurate neurodata sets.

"We want this to be part of a continued engagement across sectors, whether it is in cutting edge research, development of technologies, third party services providers, or members of the public, and we want to continue talking to better understand and set up what our views are on the critical privacy issues," he said.



Informed consent?

A critical component of the event’s discourse related to the need for consideration and definition of consent when using neurotechnology devices and services.

Finlay said it was important consider this challenge from a practical perspective and said new technologies may require more effort than simply adapting existing concepts.

“If I look at the Privacy Act in Australia, it really does place the onus on the individuals to understand how their data is used and asks them to provide informed consent via privacy policies and collection notices that, to be honest, even trained lawyers often find difficult to understand,” she said.

Prof Rosenfeld said these considerations grew even more complex when the organisations seeking consent had a commercial interest in a neurotechnology device’s use, such as when they were monetising the data it collected. While this was less of a concern in scenarios where devices were being used to restore human functions, different standards were needed when devices were used for augmentative purposes.

“And then what are the effects of the augmentation, and what if they don’t work?” Prof Rosenfeld asked. “What recourse does the person have?”

The panel session was followed by a presentation from Dr Allan McCay, who described how the convergence of neurotechnology and AI was enhancing the interpretation of neurodata, and further heightening concerns regarding data privacy.

Dr McCay said these concerns were now attracting the attention of legal academics, larger law firms, professional associations, and national and supranational bodies, with UNESCO publishing a report on neurotechnology and human rights at the beginning of this year, and various regulators in the UK, US, South America and elsewhere investigating and in some cases actively pursuing regulatory measures. These included consideration of new regulations for consumer devices, especially where they stimulated the brain in some way rather than simply reading and interpreting its data.

Dr McCay said many of these discussion had been pioneered in Chile, which had undertaken neurotech-inspired constitutional change in 2021 and currently had a bill passing through its legislature - the Neuroprotection Bill. In Argentina a bill was being passed to stop criminal justice authorities from non-consensually using brain reading technologies during interrogations.



The fact that both countries had previously been governed by oppressive regimes was suggested as possibly playing a motivating role, in conjunction with other considerations, in their proactive stance in preventing the abuse of neurotechnology.

Criminal considerations

Rapid advances in neurotechnology and its transition into commercial availability mean consideration of its ethical and legal consequences are becoming critical.

One example discussed was a device from the US company Brainwave Sciences which was advertised as being a ‘game changing tool for national and homeland security, intelligence, defence, and law enforcement agencies’ due to its purported ability to detect whether people had seen specific images.

Dr McCay said there were also considerations for criminal law, such as in circumstance where a neurotechnology device was used to control a secondary device such as a drone or robotic dog, which could then be used to commit a crime.

“There is something odd about the criminal act here, because usually when we act, we act thorough our bodies, and if someone controls a robotic dog, the conducting constituting the ‘actus reus’ is a nonstandard criminal act,” he said.

If allowed to develop unchecked, Dr McCay said the implications of neurotechnology for criminal law were profound.

“Hacking into Optus is one thing, but it seems worse to hack into somebody’s neural device or hack into their brain and manipulate neural activity,” he said. “One issue might be whether to create new offences related to ‘brain jacking’ or hacking a neural device.”

These considerations also extended to future options for sentencing. Dr McCay cited as an example the ability to use neurotechnology to determine when a person with epilepsy was at risk of suffering from a fit and the stimulate the brain to avert it.

“You can imagine a device where, instead of looking for the precursors to an epileptic fit, it looks for the precursors to angry outbursts, and does some kind of intervention to avert it and calm the person down,” he said.

Such a device might present another option to offenders in place of a custodial sentence, in the same way that geolocation devices were sometimes currently used to in relation to sentences served in the community.

Regulatory intervention

These developments naturally create profound implications for the government agencies that will ultimately be responsible for regulating them.

The head of Strategic Digital Initiatives at the NSW Government Chief Information and Digital Office Dr Kate Harrington questioned how far ahead of these developments governments needed to be.

“We are in quite a strong position when it comes to health data and thinking about neurotechnology purely from a health of medical perspective,” Dr Harrington said. “Where it becomes more challenging for people writing policy and looking at consumer protection is where it becomes industry – or technology – led. Who own that data and who has rights to that data, how long it will be kept, and what rights do consumers have to appeal to government to intercede on their behalf?”

These questions also extended to the role of governments as users of neurotechnology, particularly in relation to functions such as policing.

“Just because we can, doesn’t mean we should,” Dr Harrington said. “Where do we strike that balance between giving our law enforcement officers all the tools at their disposal to get the right outcome, and where do we look at human rights, and how do we walk that balance?”

She said these questions were being further complicated by the rapid emergence of AI and the metaverse, and asked what the augmentation of people using neurotechnology and AI would mean for concepts such as identity.

“From a government policy perspective we can’t look at all these things in isolation,” Dr Harrington said. “When you think about government as a user or practitioner in this space, how well do we need to be assured that the person that we are interacting with is the person they claim to be, and under what circumstances does that need to be an assured identity versus a pseudonym?”

Another area of consideration was neurotechnology’s use in the labour force. Partner at Herbert Smith Freehills, Drew Pearson, said employment law was already complicated by the many rights of employees and obligations of employers to ensure a safe place of work. He suggested one of the keys to the safe adoption of neurotechnology would be clear communication regarding its benefits and risks.

“The key is to be able to explain to employees this is what we are doing – the technology and the information being collected – and what the information is being used for, and what the risks to the individual are,” he said.

Biomedical neurotech and human rights

The next panel session was led by a presentation from Stephanie Herrmann, an international human rights lawyer at Perseus Strategies, LLC in the United States, who also acts as the outside general counsel to the Neurorights Foundation.

Herrmann echoed the sentiment that neurotechnology’s development was outpacing regulation.

“The brain is not just another organ, but the one that houses our personalities, our memories, our imaginations and our decision making,” she said.

To contend with this challenge, Herrmann said the Neurorights Foundation had worked to understand how existing international treaties might serve to protect neurorights, using the Morningside Group’s interpretation of five ways in which neurotechnology could impact human rights as the basis for its examination. These were the rights to agency, identity, equal access to mental augmentation, mental privacy, and freedom from algorithmic bias.

“Existing international human rights treaties were written at a time when these technologies did not exist, and so their language does not clearly contemplate the myriad ways in which this technology could infringe on these rights,” she said. “We don’t always know what will be possible with the technology, but what we want is a useful legal precedent to work with in international human rights law.”

“The Neurorights Foundation found that the best protected neuroright was the right to agency or free will, followed by the freedom for algorithmic bias, and the worst protected neuroright is ironically the right to identity and the sense of self.”

While significant additional work was required to interpret existing treaties or create new ones, Herrmann said those countries that undertook this task would by extension be working to implement appropriate safeguards for human rights within their own jurisdictions, as their national laws would need to fall in line with their new international obligations.

This would ensure countries were better able to safeguard against potentially damaging uses for neurotechnology, such as business models that collected user data that was not core to a product’s function. She said this challenge was compounded by the sharing, storage, and sale clauses in user agreements, which currently enabled organisations to do whatever they liked with the neurodata they were collecting.

“It introduces to me a completely new level of invasiveness in technology,” Herrmann said. “A lot of law says your brain is your last bastion of privacy, and something that can so clearly take data from it – and unknown amounts of that data – is frightening.”



Positive outcomes

Herrmann was joined in discussion by Professor Nicholas Opie, cofounder and chief technology officer of the brain technology interface company Synchron, which has created a non-invasive way to get sensors into the brain by inserting them into the venous system.

Prof Opie reminded attendees of the importance of keeping an optimistic mindset in relation to neurotechnology's potential.

"It is not all doom and gloom and marketers trying to steal your stuff - there are some really good things that can be done with this technology," he said.

Prof Opie explained that while much of the data being collected by devices was not able to be analysed at this time, future advances in AI and analytics techniques might create analytic techniques that rendered that data invaluable.

"There are probably some interesting things in there that we don't have the time, bandwidth, power, intelligence to understand, and utilising AI to look at all of this data might be useful," he said.

Also speaking in this discussion was Professor Michael Witbrock, director of the NAOInstitute at the University of Auckland's Faculty of Science, and chief executive officer of the neurotechnology company TransAxon. Prof Witbrock described his work using neurotechnology to better understand AI, and the opportunities he saw to enhance people's engagements with virtual environments by using neurotechnology to introduce sense such as touch, smell, and taste.

"The dream of virtual reality can only be realised by brain computer interfaces," Prof Witbrock said.

As neurotechnology developed, Prof Witbrock said more areas of the brain would become accessible, including those related to memory, which could have a profound impact on learning.

"It would seem like you know stuff, but it is actually coming from a computer," Prof Witbrock said. "I am quite confident that we are going to get to that point, and that that point will be mediated by strong AI systems. So we are on a path to very serious augmentation of human capability, and that opens up all sorts of cans of worms."

Prof Witbrock also raised the notion that while human beings might be the only species widely recognised as having advanced capabilities for reasoning and creativity, that did not mean that we were actually good at these tasks, and that augmentation of the brain using neurotechnology and AI could offer significant advantages.

The ability for enhancement using neurotechnology was also discussed by Scheeler, who spoke of his company's own work in brain mapping and to improve understanding of neural pathways. This capability was currently used to provide guidance for brain surgeons, but the same technology could be used to make recommendations for treating mental illness using neurostimulation devices.

"You can also use that technology to make yourself smarter or better at maths or more creative," Scheeler said. "I do have a concern that our technology in the hands of Big Tech becomes just another tool of manipulation, where our technology could be used to aid an advertisers or a platform that is trying to get even more into our brain than advertising already does."

The notion of augmentation was also discussed in a military context, with Prof Rosenfeld describing proposals that would see soldiers augmented using AI to accelerate decision-making.

"As soon as you augment a human, and particularly when you implant the device, you are dealing with a cyborg, so how much is the AI system controlling the soldier and how much is the soldier doing it?" Prof Rosenfeld asked. "That is where the ethical boundary gets very blurred. To have an ethical soldier you need to have an independently thinking soldier whomakes decision as a human being, not as a machine. The machine can augment and complement the human decision making but it should not replace it."

But as to whether we could get to a point where it would be possible to download the essence of an entire human, Prof Witbrock said there was no way to know.

"Only when we can get very high-resolution sensing, probably down to the individual neuron level, will we know," he said. "And even there it is not clear that we can get enough signal about the causal relationships between the firings of neurons and at what level of aggregation they predict essential aspects of your personality."

"Ultimately we don't know, but as we go towards having that data, we have a lot of techniques for approaching the inference problem."

While no boundaries currently exist regarding neurotechnology's future possibilities, what is certain is that the speed at which it is developing means more effort is needed if governments and other regulators are to have any hope of keeping up.





the imperative considerations Human Rights, Ethics, Law and Policy

Wednesday, 17 May 2023
Sydney

It is evident that these imperative considerations in neurotechnology require a collaborative approach to ensure the correct frameworks and guardrails are adopted. Following two highly successful forums, stakeholders have suggested Jewelrock facilitate a broader event to gather the neurotechnology community and policy and law makers to discuss and legislate the human rights, ethical, legal and policy guidelines which would take a determined step forward in positioning Australia as a global leader in this arena.

This strategic and outcome focused event will be planned for late 2024.

Andra
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