



What if the world agreed on a charter for brain–computer interfaces (BCIs)?

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Neural Charter

Within Reach

Transitional

Visionary

UNCERTAINTIES

Collaboration, Values

MEGATREND (Most significant)

Future Humanity

TRENDS

Cross-Sectoral Partnerships
Data Protection & Privacy
International Collaboration
Neuroscience
Open Data

TECHNOLOGIES

Advanced Connectivity
Brain–Computer Interfaces (BCI)
Human–Machine Interfaces

SECTORS IMPACTED

All Sectors

KEYWORDS

Cognitive Divide
Cybersecurity
Global Charters/MOUs
Neural Data Privacy
Regulations/Governance

A global brain–computer interface (BCI) charter and framework ensure global alignment through openness, safety standards, and responsible deployment, enabling ethical implementation and equitable access worldwide.





WHY IT MATTERS TODAY

The global BCI market
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There is increased interest in BCIs. The global BCI market is projected to grow from \$1.74 billion in 2022 to \$6.2 billion by 2030, with a compound annual growth rate of 17.5%.¹²⁰³ Applications of BCIs are growing¹²⁰⁴ and include gaming,¹²⁰⁵ integration with AI¹²⁰⁶ and the metaverse,¹²⁰⁷ and treatment of strokes,¹²⁰⁸ spinal cord injuries,¹²⁰⁹ brain injuries,¹²¹⁰ and ALS (amyotrophic lateral sclerosis).¹²¹¹ The United States is leading advances in BCIs due to significant R&D funding, followed by Europe and emerging economies such as Brazil, India and South Africa.¹²¹²

With BCIs come critical challenges, including clarity in classification. While BCIs offer transformative benefits for healthcare and human enhancement, they present unique vulnerabilities in data security, with neural data requiring stringent privacy safeguards.¹²¹³ At the same time, more organisations are facing shortages of critical cybersecurity professionals (42% of organisations in 2022 versus 53% in 2023).¹²¹⁴ In terms of classification, while non-invasive (external) BCIs are currently more common, invasive (implanted) BCIs raise more concerns for society about their psychological and neurophysiological impacts.¹²¹⁵ An alternative classification divides BCIs into those used for therapeutic purposes and those designed to augment humans' capabilities.¹²¹⁶

BCIs risk creating a new cognitive divide between the world's rich and poor. With just over a third of the global population – approximately 2.85 billion people¹²¹⁷ – still lacking basic internet access, the introduction of sophisticated BCIs threatens to exacerbate existing digital divides. As these devices promise revolutionary medical treatments and cognitive enhancements, there is a real risk of creating an unprecedented gap between those who can access and pay for these technologies and those who cannot.¹²¹⁸



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THE OPPORTUNITY



BENEFITS

Clear regulatory guidelines for BCI; is supporting of equitable access; protection of individuals' rights; reduced risk of societal harm; minimised risk of exploitation; increased public awareness.



RISKS

Privacy breaches exposing neural data; global regulatory framework incompatibility; unintended harm of those who reject BCIs; uneven global adoption.

Anticipating breakthroughs in BCI technology, a global charter and framework aligns implementation of BCIs across nations, focusing on three pillars: open research, safety standards, and responsible deployment.

The open research pillar includes a commitment to open access publications on BCI research and clinical trials, along with knowledge sharing and the registration of individuals equipped with BCIs. Algorithms, paired with robust privacy protocols for sensitive data, are shared solely with the signatories to ensure tamper-proof and fail-safe designs.

The safety standards pillar establishes rigorous hardware certification, software security, and ethical safeguards. It emphasises privacy protection, anti-discrimination measures, and cybersecurity to minimise risks such as brain tapping (uncovering confidential brain data), feedback manipulation, and adversarial attacks (manipulating the machine learning model in BCIs).¹²¹⁹

The responsible deployment pillar addresses diverse global contexts with guidelines for assessing risk, aligning local regulations, and monitoring societal impact. A global BCI governance body coordinates these efforts through regional committees, national regulatory bodies, and a technical advisory board comprising experts in neuroscience, ethics and cybersecurity.

The framework focuses on three key pillars: openness, safety standards, and responsible deployment

