Dr. José Manuel Rodríguez Delgado, professor of neurophysiology at Yale University, 1965

Neurotechnology, neurodata and data protection

Singapore – APPA - 2025

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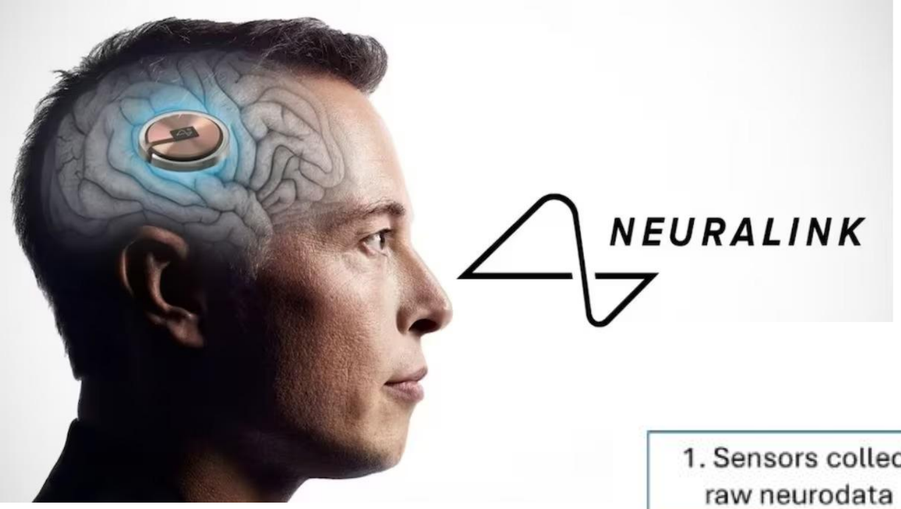
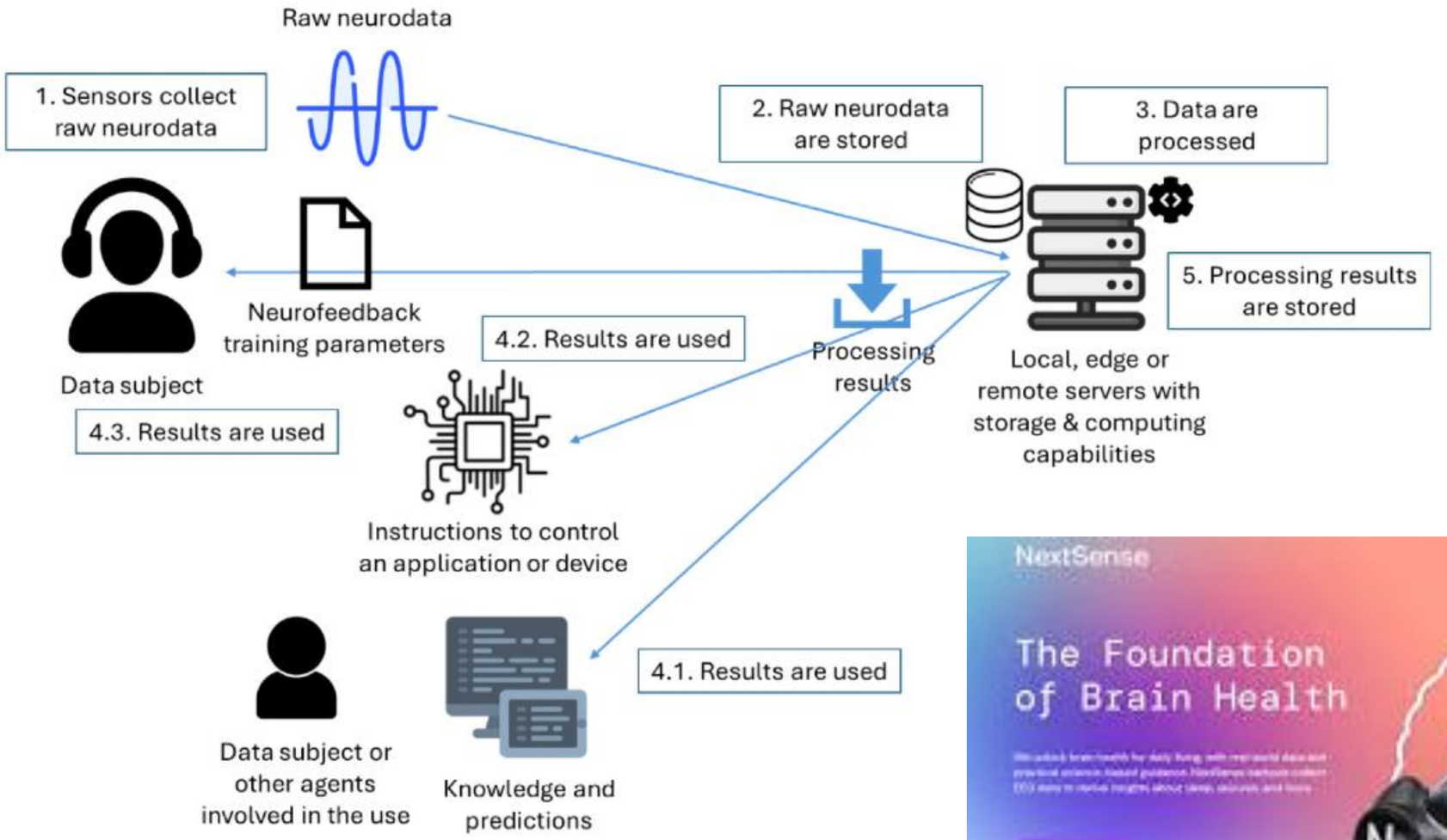
https://www.aepd.es/en/areas/innovation-and-technology

SPANISH DATA PROTECTION AUTHORITY



BCI
Brain Computer Interface



Applications

Neuroscientific research

- Prosthetic
- Restore senses such as sight or hearing
- Assisting living of impaired people ...

Clinical use (under professional supervision)

- Transcranial Magnetic Stimulation (TMS) for migraine treatment
- Deep Brain Stimulation (DBS) for essential tremor, Parkinson's disease, ...
- Psychology: insomnia, addictions, depressión...

Others

- Wellness
- Education
- Gaming, virtual reality
- Human resources
- Law enforcement, border control
- Work surveillance, robotics
- Safety
- Neuromarketing
- Military
- Neuroenhancement

...

Neurotechnology

Devices and procedures, both invasive and non-invasive, that directly record and process neurodata with the aim of gathering data, controlling interfaces or devices, or modulating neural activity

First approach

Neurodata (first-order):

- Information gathered from the brain structure (anatomical and physiological aspects)
- Information gathered from the function and activity of the brain (neurorecording or neuroimaging)
- Data related to the peripheral system. Peripheral Nerve Interface (PNI) devices

Inferenced from Neurodata (second order):

- Person's physical health or fitness, reasoning and problem-solving, mental state, decision-making, comprehension, memory retrieval, perception, language, emotions-attitude, etc.
- Brain fingerprint

Neurostimulation and neuromodulation processing

- Feeding signals into the brain
  - Neurostimulation provides a short-term alteration of brain patterns
  - Neuromodulation provides a longer-term alteration

Taxonomy and Multiface technology

Data collection – Brain manipulation

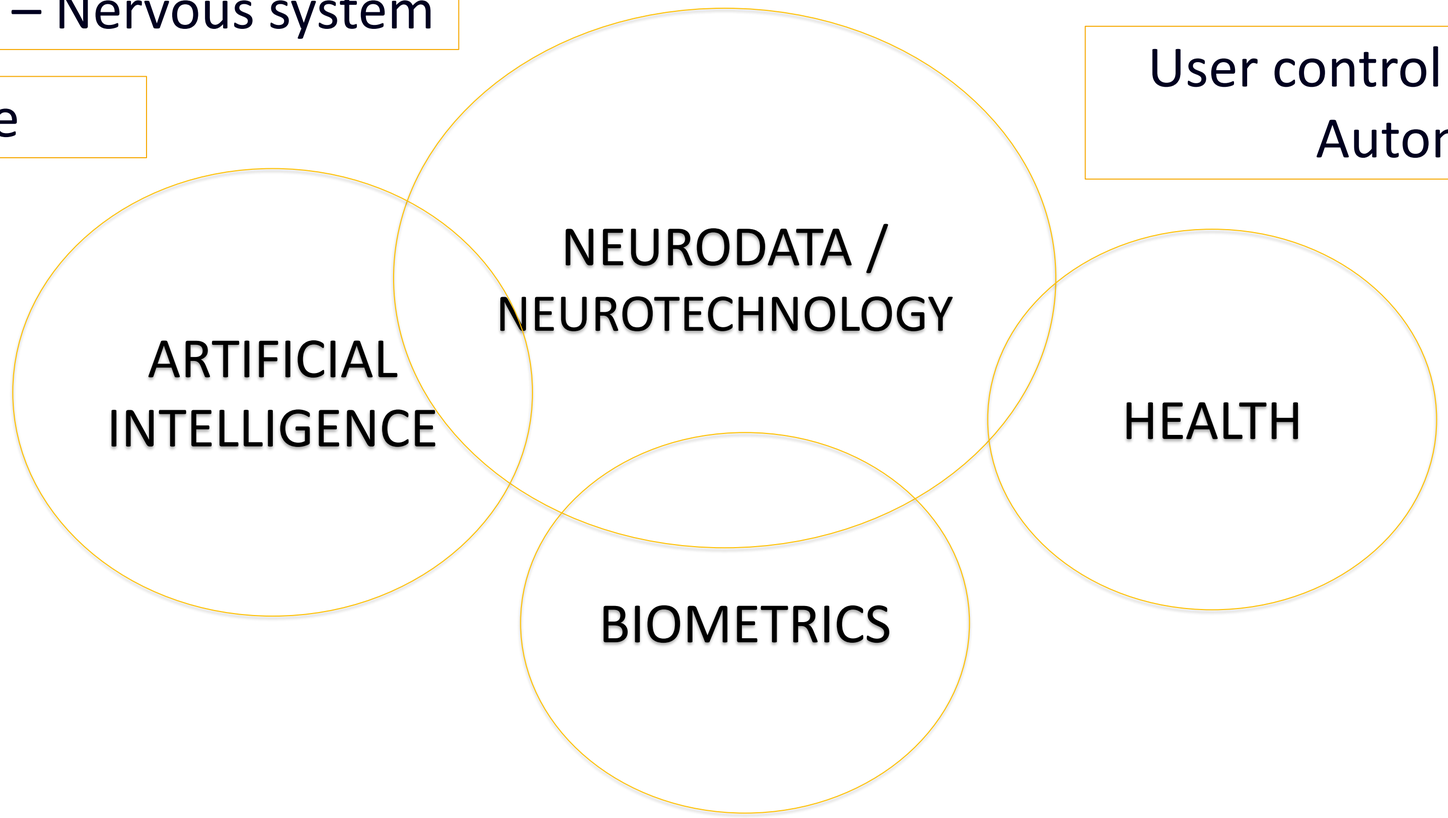
Invasive – No invasive

Active – Pasive - Reactive

Brain – Nervous system

User control – Third party - Autonomous

Local - Remote



Data Protection approach

Nature of neurodata:

- Personal data
- Unique identifier
- Special category of personal data:
  - Biometric ID
  - Health data
  - Emotions, beliefs, etc.

Is neurostimulation/modulation under the scope of data protection?

- GDPR is about data processing with a final purpose
- Yes, in the framework of a personal data processing due to collecting, recording, storing, and analyzing neurodata and other personal data to generate feedback signals with **purposes** that could be **from clinical treatment to neuromarketing**.

Neurodata vs Genetic Data:

- Both a regarding physical characteristics of a person
- Both could be linked to single person
- Both could reveal health information and other.
- Both could have similarities between relatives

- Genetic is read only information (at least digitally).
- Neurodata could be read/write information.

Data protection challenges when <u>processing</u> neurodata

Depend highly on domain applications / use cases

Lawfulness

Transparency

Risks for the right and freedoms

Privacy by Design/Default

Data minimisation

Effective, Necessary and Proportional

Data accuracy

Data breaches and Security

Fairness and new discriminations

CHILDREN

Neurotechnologies represent an unprecedented intrusion, perhaps even the ultimate step, into individuals' private sphere

Before further progress is made, it seems **essential to undertake an in-depth analysis** of neurodata and neurotechnologies and assess its **impact on fundamental rights and freedoms**.

Beyond data protection

Proposed neurorights

1. **Cognitive liberty**. The freedom of a person to decide whether their brain activity and mental processes can be recorded and/or modulated or not.
2. **Mental privacy**. The freedom and capacity of a person to conceal their mental information and to prevent non-consented intrusion into their cognitive domain.
3. **Mental integrity**. The prohibition of non-consensual and harmful modulation of a person's neural activity.
4. **Psychological continuity**. The right to preserve one's personal identity and continuity of one's mental life from non-consensual external alteration by third parties.
5. **Fair access**. The ability to ensure that the benefits of improvements to sensory and mental capacity through neurotechnology are distributed justly in the population

Innitiatives

Just some of them ...

Research initiatives

- US, the so-called BRAIN Initiative: Brain Activity Map Project
- Asia, the China Brain Project
- Europe, the Human Brain Project (HBP): infrastructure EBRAINS ...

Regulation initiatives in neurorights

- 2021 - Chilean constitution amendment about protection of brain activity
- Chilean bill regulating the research, development and advancement in neurotechnologies
- 2024 - Mexico General Law on Neurorights and Neurotechnologies
- USA, Brasil, ...
- The Council of Europe has begun work on data protection and neurotechnology guidelines, which it expects to publish in January 2027.

Innitiatives

Just some of them related with data protection...

https://www.aepd.es/guias/neurodatos-aepd-edps.pdf

Soft Law and standarization

- OECD Neurotechnology toolkit
- AEPD – EDPS TechDispatch Neurodata
- Statement on neurodata of the Iberoamerica Network of Data Protection
- Berlin Group working paper (in progress).
- ISO 27574 “Privacy in brain-computer interface (BCI) applications” AEPD - Bureau of Indian Standards (in progress) ...

Neurodata: privacy and protection of personal data (II)

18 January 2023

Brain-computer interfaces make possible to record the activity generated by the brain. This activity depends on internal and external factors to the individual, which act on a certain genetic basis. These technologies allow the collection of neurodata which, as they are associated with identified or identifiable individuals, are personal data. These technologies could allow profiling, they could also infer new personal data, modify the behavior and they could themselves be biometric identification and authentication mechanisms.

https://www.aepd.es/en/areas/innovation-and-technology#Neurodata

DECLARACIÓN SOBRE NEURODATOS DE LA RED IBEROAMERICANA DE PROTECCIÓN DE DATOS

(Aprobada en sesión cerrada del encuentro de la Red Iberoamericana de Protección de Datos, con motivo del XX aniversario celebrada en La Antigua, Guatemala el 25 de septiembre de 2023)

Las Entidades integrantes de la Red Iberoamericana de Protección de Datos, en el marco de la sesión cerrada del Encuentro conmemorativo del XX aniversario de su fundación, han acordado formular la siguiente

DECLARACIÓN

https://www.redipd.org/documento/declaracion-neurodatos-ripd.pdf

Thank you!

INNOVATION AND TECHNOLOGY DIVISION

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