

What is consciousness?

Can it be measured?

Can it be altered through  
electromagnetic brain  
stimulation?



Horizon 2020

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Studying Consciousness  
in the electrical brain

LUMINOUS

# Studying, Measuring and Altering Consciousness in the Electrical Brain

**Studying, modelling, quantifying, and altering observable aspects of consciousness.**

What is consciousness? Can it be measured? While humankind has struggled with these questions for millennia, our project focuses on more modest but nonetheless ambitious and related goals, inspired by recent developments in neuroscience and the potential role of fundamental concepts

such as information integration and algorithmic complexity.

## Our vision

is that consciousness will someday be electromagnetically measured and altered through Non-Invasive Brain Stimulation. The associated insights will prove crucial to the development of cognitive sciences.

## The project explores

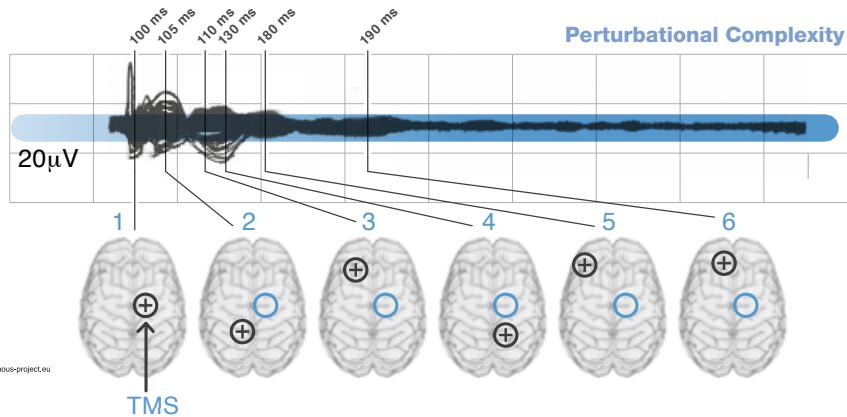
the prospects for clinical translation of these technologies, and its ethical implications. We expect that this paradigm-shifting work will have profound social and clinical impact and provide key discoveries in fundamental neuroscience and artificial intelligence research.

## Luminous project / Starlab

<http://www.luminous-project.eu/>  
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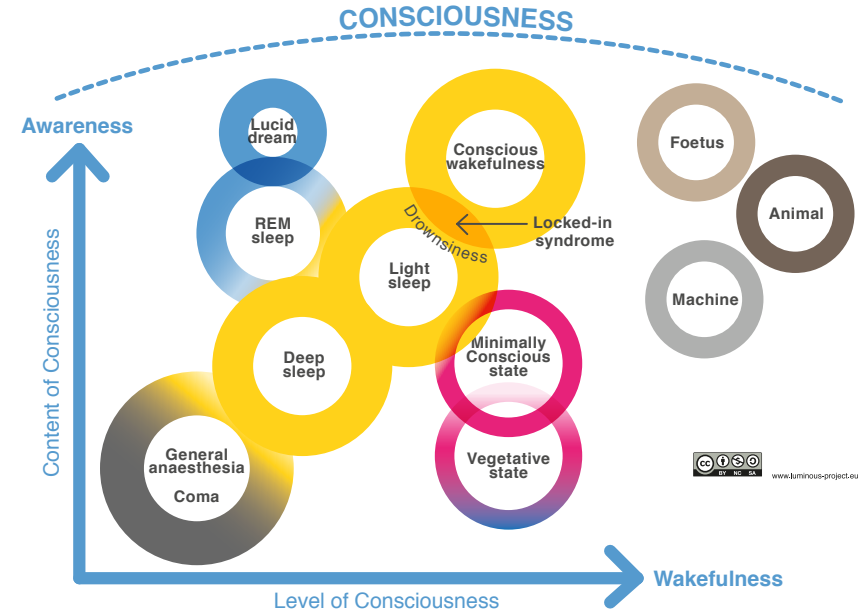
## measuring consciousness

Inspired by a consciousness measuring technique based on magnetic pulses to stimulate the brain and measure the resulting brain complexity, we aim to create non-invasive technologies integrating brain monitoring and non-invasive brain stimulation with advanced analysis techniques including artificial intelligence.

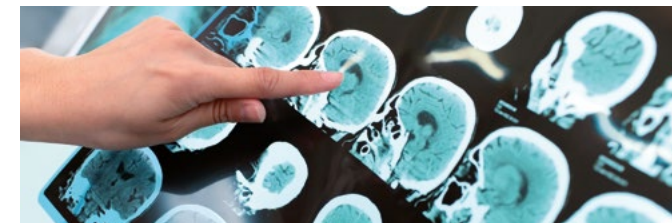


## consciousness study

Supported by computational neuroscience models, machine learning, and human studies in different states such as healthy perception, sleep, anaesthesia, locked-in syndrome, coma, and in utero, we aim to disentangle the essential aspects of consciousness.



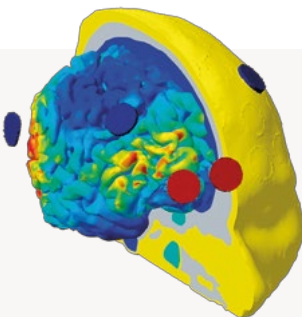
**Consciousness in utero** is measured using fMEG, a non-invasive biomagnetic imaging technique applied outside the maternal abdomen to determine neural activity of the foetus.



**Consciousness in coma, sleep, and anaesthesia** is measured through EEG, a technique whereby electrical brain activity can be non-invasively recorded.

# altering consciousness

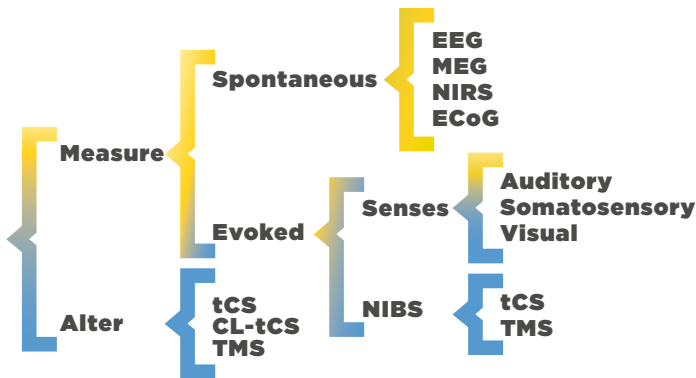
Restoring consciousness in coma patients is crucial. Our aim is to develop effective non-invasive stimulation technologies of the fronto-parietal network (among others) to alter consciousness in research and medical applications.



## technology breakthrough

- 1) The creation of a new class of consciousness-probing technologies that bypass or minimize the use of sensory, motor or executive functions.
- 2) The electric alteration of consciousness for its extensive clinical usage, and exploring further applications.

### LUMINOUS Techs for studying consciousness



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