Are you submitting the idea:
☒ **in your personal capacity?**
☐ **on behalf of an organisation?**

1 Title of your idea

Please provide a short title that accurately reflects the objective(s) of your idea:
Objective Clinical Characterization and Prediction of Mental Disorders Evolution

2 Scope

Explain the specific challenges/problems to be addressed by your idea and how these affect relevant stakeholders, taking into account what is already known and/or available in the field:
Unmet needs

Replacement of subjective evaluations with objective longitudinal sensor and mathematics based complexity analytics, similar to HRV fractal analysis routinely used in CVS analysis.

Cassiopée approach replaces, e.g, Cosinor-based rhythmometry or Young Mania Rating Scale, as a measure of activity or energy in the symptomatology of Bipolar Disorder in real time and not only on daily summary subjective evaluations.

Solution

The Cassiopée computational ecosystem provides actionable complexity analysis of Large Sensory Data yielding narrative for care-givers in terms of computer aided diagnosis of particular neuro-pathologies, e.g., Bipolar Disorder.

Benefits

Shorten hospital stays, optimal drug usage, targeted therapy, less nurses needed, monetary savings, manic state predictability.

Benefits to the patients

Less side-effects, mollification of highs and lows, more precise and effective therapy based on nearly real time evaluation of brain pronunciations through surrogate sensory data and their complexity analysis.

Please indicate which IHI specific objective(s) (SO), as described in the IHI Strategic Research and Innovation Agenda (SRIA), your idea addresses:

["SO5: enable the development of new and improved evaluation methodologies and models for a comprehensive assessment of the added value of innovative and integrated health care solutions"
"SO2: integrate fragmented health research and innovation efforts bringing together health industry sectors and other stakeholders, focusing on unmet public health needs, to enable the development of tools, data, platforms, technologies and processes for improved prediction, prevention, interception, diagnosis, treat- ment and management of diseases, meeting the needs of end-
users   "]

Please select the keywords that are most relevant to your idea:
  ["Mental health"
"Diagnosis"
"Detection"
"Prediction"]

In alignment with the IHI specific objective(s) selected above, specify the objectives of your idea:

Replacement of subjective diagnoses with sensor based objective approach and predictions of mental disorders evolutions

3   Expected <u>impacts</u> to be achieved by your idea

Briefly describe the expected impacts to be achieved by your idea, ensuring that they contribute to IHI general and relevant specific <u>objectives</u>, as described in the IHI SRIA:

Impacts are wider long-term effects on society (including the environment), the economy and science, enabled by the outcomes of R&I investments. Impacts generally occur sometime after the end of the project, e.g. successful implementation of digital solutions supporting people-centred care.

IHI general objectives: 1. contribute towards the creation of an EU-wide health research and innovation ecosystem that facilitates translation of scientific knowledge into innovations, notably by launching at least 30 large-scale, cross-sectoral projects, focussing on health innovations; 2. foster the development of safe, effective, people-centred and cost-effective innovations that respond to strategic unmet public health needs, by exhibiting, in at least 5 examples, the feasibility of integrating health care products or services, with demonstrated suitability for uptake by health care systems. The related projects should address the prevention, diagnosis, treatment and/or management of diseases affecting the EU population, including contribution to 'Europe's Beating Cancer Plan'; 3. drive cross-sectoral health innovation for a globally competitive European health industry and contribute to reaching the objectives of the new Industrial Strategy for Europe and the Pharmaceutical Strategy for Europe.

Mental Health Predictive Tool

Tool predicting changes of mental health, in particular Bipolar Disorder and/or schizophrenia. The collection of tools provide early warning of, e.g., manic relapses. The approach should be based on advance wearable bio-sensors and high level mathematical models including Machine Learning based classification and/or optimized stochastic extrapolation of surrogate sensory time sequences.

Prediction of Bipolar Disorder Impact

Uncovering Hidden Signals of Mania will help clinician to characterize the state and the imminent evolution of mental disorders. It is important to predict true remission and a temporary reduction in symptoms, as the latter may result in premature treatment decisions and/or discharge from the hospital, leading to relapse or exacerbation of symptoms.

Info: cassiopee.org or support@cassiopee.org

4   Why should your idea become an IHI call topic?

Explain why collaboration through a cross-sectoral and multidisciplinary public private partnership is needed in particular:

Why does it require collaboration among several industry sectors (*e.g.* pharma, vaccines, biotech, medical devices, in vitro diagnostics, radiotherapy, medical imaging health ICT)?

Why does it require collaboration between private (industry) and public partners (*e.g.* academia, healthcare practitioners, patients, regulators)?

The objective approach to predictability of Mental Disorders requires: mathematics, psychiatry, neuroscience, microelectronics, IT, engineering. This combination of areas is not part of medical wards. MDs are not delivers but users. Some of the technologies is being developed by private sectors, e.g., AI.

Why is the contribution of industry needed to achieve the expected impacts?

Contribution of industry: Large companies that are members of the IHI industry partners (i.e. COCIR, EFPIA, EuropaBio, MedTech Europe, Vaccines Europe) contribute to the programme, primarily through 'in-kind' contributions (e.g. their researchers' time, laboratories, data, compounds). At least 45% of each project's total costs have to be in-kind contribution.

Needs: microelectronics, IT, engineering