**Research Proposal Presentation Outline**

* **Project Title**:
  + Machine Learning to Enhance Prediction of the Safety of Medications for Severe Depression
* **Significance/Contribution to the discipline/Research Problem**:
  + The key contribution of this research would be the development of an explainable high-performing Machine Learning-driven algorithm that can complement traditional statistical methods to enhance the prediction of safety of medications used to treat severe depression or major depressive disorder.
* **Research Question**:
  + Can a Machine Learning-driven algorithm be as explainable as reliable to enhance the prediction of safety of medications for severe depression to complement traditional statistical tools currently used to perform it?
* **Aims and Objectives**:
  + The key aim would be to develop a Machine Learning-driven algorithm that is as explainable as reliable to enhance the prediction of safety of medications.
  + The key objectives would be the following ones:
    - To ensure the Machine Learning-driven algorithm is explainable:
      * Both technical and end-user explainability will be guaranteed respectively by leveraging an intrinsically interpretable algorithm, e.g., a decision tree-based one, and by reverse engineering its predictions to the key parameters leading to them, which clinicians could fine tune based on their knowledge of a patient’s case and history, as well as expertise and experience in Psychiatry.
    - To ensure the Machine Learning-driven algorithm is reliable:
      * Its predictive performance would be evaluated on publicly available benchmark datasets that would guarantee its replicability, reproducibility, and reliability by leveraging gold-standard predictive performance metrics.
* **Key literature related to the project**:
  + The key literature related to the project will mainly leverage that already submitted in the first assignment and build upon it to expand it for filling specific research gaps to enhance the explainability and reliability of such clinically relevant predictions.
* **Methodology/Development strategy/Research Design**:
  + The methodology will involve the development and validation of a Machine Learning-driven algorithm for predictive analytics, along with the evaluation of its predictive performance against publicly available benchmark datasets and clinically relevant and interpretable predictive performance metrics.
* **Ethical considerations and risk assessment** (as part of your ethical approval application):
  + As secondary, publicly available datasets will be used, and their licence will be checked to ensure its usage for these research purposes, there is no risk or ethical approval required.
* **Description of artefact(s) that will be created** (if applicable):
  + As this is a research proposal presentation, no software artefact would be created, but the project itself, if pursued beyond this proposal stage, would involve the development and validation of a Machine Learning-driven algorithm using Python programming.
* **Timeline of proposed activities**:
  + The development and validation of such a predictive algorithm would be achieved in an Agile release cycle, which typically includes three fortnightly sprints, i.e., within six weeks.