# **PROJECT CHARTER**

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| 1. Informação geral | | | | | | | | | | | | |
| Nome do Projeto: | | | Assessing the automatic generation of property-based tests using public domain LLMs | | | | | | | | | |
| Sponsor: | | | Nuno Filipe Teixeira Malheiro (NFM), José António Reis Tavares (JRT) | | | | | | | | | |
| Departamento | | | **DEI** | | | | | | | | | |
| 2. Equipa do Projeto | | | | | | | | | | | | |
| Cargo | **Nome** | | | **Departamento** | | | **Contact Tel** | | | **E-mail** | | |
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| **3. Stakeholders** | | | | | | | | | | | | |
| Nome | | | | | | | | | Poder | | Interesse | |
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| 4. Âmbito | | | | | | | | | | | | | |
| **Problema / justificação** | | | | | | | | | | | | | |
| **Problem:**   * Property-Based Test is a testing methodology based on specifications of properties of * PBT’s main strength lies in testing complex code, using a wider range of input data than what would be used * It’s an hardous task to define properties that are relevant and complex random data generators. * Large Language Models are starting to be used for automatic property generation, however the properties generated are not always correct.   **Research Area:**  Software Testing, Property-Based Testing and Artificial Intelligence.  **Research Topic:**  Capabilities of current public domain LLMs in the area of PBT when compared with master’s level students. | | | | | | | | | | | | | |
| **Objetivos do projeto** | | | | | | | | | | | | | |
| **General Objectives:**   * Access the current capabilities of LLMs in terms of property based testing when compared with master’s level students. * Determine how to obtain better results when using LLMs to establish properties.   **Specific Objectives:**   * Identify metrics to evaluate PBT * Generate PBT using public domain LLMs * Compare the PBT generated by LLMs with ones created by master’s students in previous years   **Methodology:**  The research conducted in this dissertation will be done according to the Systematic Literature Review.  **Research Questions**  **Question 1:** What are the most effective and measurable metrics for assessing the quality, correctness, and usefulness of property-based tests (PBT) and domain generators.  **Question 2:** What techniques can be employed to enhance the performance of Large Language Models in generating property-based tests and domain generators.  **Question 3:** What are the most effective ways to question an LLM for the automatic creation of property-based tests (PBT) and domain generators.  **Question 4:** How good are LLM automatic creation of property-based tests (PBT) and domain generators, when compared with master level students.  **Hypothesis:**  Current LLMs are capable of achieving the same results or even outperform master’s level students. | | | | | | | | | | | | | |
| **Benefícios** | | | | | | | | | | | | | |
| * Identify the most suitable LLM for PBT generation. * Determine the most effective techniques for using LLMs in PBT generation. * Assess the gap in skills between LLMs and humans in PBT generation. | | | | | | | | | | | | | |
| **Entregáveis** | | | | | | | | | | | | | |
| Diagnóstico de competências  Plano de projeto  Relatório de dissertação  Considerações Éticas  Quality Assessment Table  Work Breakdown Structure (WBS)  Testes de propriedades, criados por LLMs e por estudantes (anonimizados) | | | | | | | | | | | | | |
| 5. Tempo | | | | | | | | | | | | | |
| **Milestones / Datas** | | | | | | | | | | | | | |
| **Project Milestones**  Introduction**:** 12/11/2024  State of the Art**:**   * Property-Based Testing**:** 18/11/2024 * Measurement and Evaluation in PBT**:** 10/12/2024 * Large Language Models**:** 25/12/2024 * Integration of LLMs and PBT**:** 31/12/2024   **Mandatory Milestones:**:   * PREPD Delivery: : 4/01/2025 * DIMEI Delivery: 30/06/2025 | | | | | | | | | | | | | |
| 6. Custo | | | | | | | | | | | | | |
| **Fontes de custo** | | | | | | | | | | | | | |
| Paid versions of LLMs, in the eventuallity that they are used | | | | | | | | | | | | | |
| 7. Pressupostos | | | | | | 8. Restrições | | | | | | | |
| The existence and easy of access to PBT created by students | | | | | |  | | | | | | | |
| 9. Riscos | | | | | | | | | | | | | |
| **Riscos identificados** | | | | | | | | | | | | | |
| Descrição | | | | | | | | | Causa | | | Efeito | |
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| **10. Aprovação** | | | | | | | | | | | | | |
|  | | | Nome | | | | Assinatura | | | | | | Data (DD/MM/YYYY) |
| Sponsor | | |  | | | |  | | | | | |  |
| Cliente | | |  | | | |  | | | | | |  |
| Gestor do Projeto | | |  | | | |  | | | | | |  |
| Notas | | | | | | | | | | | | | |
| This project does not have significant stakeholders, restrictions, or risks due to its exploratory nature. The only stakeholders involved are the proponent of the idea and myself, the student undertaking the project's development. | | | | | | | | | | | | | |