Universitat Pompeu Fabra Barcelona

# GP2526 PROJECT CHARTER

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| **Title** | Detection of Abnormal Consumption - AB Data Challenge 2025 | |
| **Project core team** | Representative: Adrià Cortés Cugat<br><br>Team Members:<br><br>● Guillem García Sansa<br>● Jofre Geli de Fuenmayor<br>Joan Company Company<br>● Marc de los Aires Tello<br>● Adrià Cortés Cugat | **Team #**<br><br>T102.D |
| **Executive Summary** | The *Detection of Abnormal Consumption* project aims to develop a data-driven system for identifying irregular water consumption behaviors using smart-meter (telelectura) data from Aigües de Barcelona. The initiative combines data analytics, feature engineering, and machine learning to detect anomalies such as leaks, malfunctioning meters, or unusual usage patterns. The project is carried out within the AB Data Challenge 2025 under the supervision of the UPF Project Management course. Its scope includes data exploration, feature creation, anomaly detection modeling, and result visualization, while excluding real-time integration or physical deployment. Success will be measured through quantifiable accuracy improvements, reproducible documentation, and effective final communication of results. The main stakeholders are Aigües de Barcelona, UPF Faculty, and the student project team. The project will follow the official AB Challenge timeline, concluding with the final presentation and evaluation in January 2026. | |
| **Background** | Aigües de Barcelona manages the integral water cycle across more than 23 municipalities, serving over 3 million people. The recent implementation of “telelectura” enables near real-time monitoring, transforming how consumption can be analyzed.<br>However, the increasing data volume requires new analytical methods to detect anomalies accurately and early. This challenge aligns with the company’s goal of applying data science and innovation to improve service efficiency and environmental sustainability.<br>The project is developed within the AB Data Challenge 4th Edition, under the supervision of UPF’s Project Management course. | |
| **Scope** | **IN**<br>● Exploratory data analysis of hourly smart-meter readings.<br>● Design and creation of engineered features capturing consumption dynamics.<br>● Implementation of anomaly detection models (ML or statistical approaches).<br>● Evaluation of model performance.<br>● Delivery of a visual or report-based prototype demonstrating results and insights. | |
| | **OUT**<br>● Real-time integration into production systems.<br>● Development of full web or mobile application interfaces.<br>● Field deployment or physical metering management. | |
| **Success Criteria** | ● Deliver all project phases on time according to the AB Data Challenge calendar.<br>● Ensure full team coordination and balanced contributions, with weekly progress reviews.<br>● Maintain complete and reproducible project documentation validated through mentor feedback.<br>● Qualify among the AB Data Challenge finalists and achieve overall team satisfaction with the outcomes.<br>● Achieve ≥90% anomaly detection accuracy with < 10% false positives on validation data.<br>● Improve baseline model performance by ≥ 5-10% in F1-score or other relevant metrics.<br>● Implement at least one innovative modeling or feature-engineering technique | |

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| | improving interpretability or precision.<br>• Deliver a clear visual or report-based prototype presenting the main results.<br>• Provide actionable insights to support early detection of abnormal consumption and water loss.<br>• Contribute to operational efficiency and sustainability goals of Aigües de Barcelona.<br>• Demonstrate the potential of data science applications for real-world water management challenges. |
| **Stakeholders** | **Stakeholder / Role / Description**<br>• Aigües de Barcelona / Project Owner / Provides data, defines challenge context, evaluates project outcomes.<br>• AB Data Challenge / Organizers / Oversee and evaluate the competition.<br>• Course Teachers (UPF) / Supervising Faculty, Solution Provider / Academic mentors guiding project management methodology. Reviews deliverables and assesses project quality.<br>• Project Core Team (Students) / Solution Developers / Responsible for implementation, documentation, and reporting. |
| **Assumptions** | • "Telelectura" data will be available as described in the challenge documentation.<br>• The project will be developed using open-source tools (Python, Jupyter, etc.).<br>• Communication with mentors will occur during scheduled mentoring sessions.<br>• Team members will equally contribute to research, development, and reporting. |
| **Constraints** | • Limited timeframe according to AB Data Challenge 2025 calendar.<br>• No dedicated budget or external resources.<br>• Workload shared with academic course commitments.<br>• Access to data restricted to the competition period. |
| **Risks** | **Risk / Likelihood /Mitigation**<br>• Data quality or missing values / Medium / Apply preprocessing, cleaning, and validation techniques.<br>• Model overfitting or poor generalization / Medium / Use cross-validation and test with unseen data.<br>• Team coordination challenges / Low / Use Trello/Drive for task management and weekly meetings.<br>• Time limitation before deadlines / Medium / Define internal milestones matching AB Data Challenge timeline.<br>• Data access delays / Low / Prepare synthetic datasets for testing prior to real data delivery.<br><br>**Opportunities**<br>- Potential collaboration or internship opportunity with Aigües de Barcelona. |
| **Costs** | No direct financial costs are expected, as the project will rely entirely on existing academic resources, open-source software (Python, Jupyter, GitHub), and cloud-based collaboration tools (Google Drive).<br><br>**Threat:** Limited access to data analysis tools or computing resources could slow experimentation and model training, potentially affecting performance.<br>**Opportunity:** The full use of open-source frameworks and university-provided infrastructure promotes cost efficiency, flexibility, and reproducibility, demonstrating the project's scalability and sustainable approach. |
| **Milestones** | 15 Sept - 19 Oct → Team formation and registration<br>20 – 23 Oct → Selection of 15 finalist projects<br>24 Oct → Official confirmation of participants<br>28 Oct - 21 Dec → Kick-off meeting and data release + Project developement<br>22 Dec - 19 Jan → Projects Evaluations<br>20 Jan → Communication of finalists<br>28 Jan → Pitch Day and awards ceremony |
| **Pitch Link** | x |

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| **Signatures** | Project core team members | (PSC representative) |