UPF – Gestió de projectes

GP2526 Project Work Plan

Detection Of Abnormal Consumption

Document Control Information

Settings	Value
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Project Title:	Detection of Abnormal Consumption
Team Number:	102.D
Project Owner:	Aigües de Barcelona
Project Core Team:	Guillem García, Joan Company, Jofre Geli, Marc de Los Aires, Adrià Cortés

Revision	Date	Created by	Short Description of Changes
v1.0	14/10/25	Adrià Cortés	Revision & Partial Correction of Week 1
v1.1	16/10/25	Adrià Cortés i Joan Company	Blue Text Removal
v1.2	16/10/25	Adrià Cortés i Joan Company	Correction From Week 1 Revision.
v1.3	18/10/25	Adrià Cortés	Iteration 1 Delivery Week 2
v1.4	19/10/25	Joan Company	Iteration 1 Delivery Week 2, WSB

The latest version of this controlled document is stored in Google Drive\GP2025-26\Subject global documents\Project methodology and templates\

1. INTRODUCTION

1.1. Project summary

The Detection of Abnormal Consumption project aims to design and implement a data-driven system that identifies atypical water-usage patterns using "*telelectura*" (smart-meter) data supplied by Aigües de Barcelona.

The project applies data analytics, feature engineering, and machine-learning anomaly-detection methods to detect leaks, meter malfunctions, and unusual consumption behaviours across aggregated municipal data.

This initiative belongs to the 4th Edition of the Aigües de Barcelona Data Challenge (2025) and is conducted under the GP2526 Project Management course of *Universitat Pompeu Fabra (EUTOPIA Learning Unit)*.

The expected outcomes are:

- A reproducible pipeline for data cleaning, feature generation, and model training.
- Interpretable results improving operational efficiency and sustainability.
- A visual or report-based prototype supporting early detection of abnormal consumption.

1.2. Success Criteria and Critical Success Factors

Success Criteria

#	Success Criterion	Description/Target
1	On-time Delivery	Deliver all project phases on time according to the official AB Data Challenge calendar.
2	Team Coordination	Ensure full team coordination and balanced contributions, with weekly progress reviews.
3	Documentation Quality	Maintain complete and reproducible documentation validated through mentor feedback.
4	Challenge Achievement	Qualify among the AB Data Challenge finalists and achieve overall team satisfaction with the outcomes.
5	Model Accuracy	Achieve ≥ 90 % anomaly-detection accuracy with < 10 % false positives on validation data.
6	Performance Improvement	Improve baseline model performance by ≥ 5–10 % in F1-score or other relevant metrics.
7	Innovation and Interpretability	Implement at least one innovative modeling or feature-engineering technique improving interpretability or precision.
8	Result Communication	Deliver a clear visual or report-based prototype presenting the main results.
9	Actionable Insights	Provide actionable insights to support early detection of abnormal consumption and water loss.
10	Operational Impact	Contribute to operational efficiency and sustainability goals of *Aigües de Barcelona*.

11	Knowledge Transfer	Demonstrate the potential of data science applications for real-world water management challenges.

Critical Success Factors

#	Area	Factor
1	Data Access & Quality	Timely access to "*telelectura*" datasets and reliable pre-processing to ensure model performance and valid results.
2	Team Coordination	Effective task distribution, communication, and adherence to defined milestones through shared tools (GitHub, Drive, Trello).
3	Mentoring & Feedback	Efficient use of limited mentor sessions to refine technical and methodological decisions.
4	Innovation & Scalability	Development of a technically creative yet realistically applicable solution capable of being extended to future city-scale datasets.

1.3. Project Stakeholders

#	Organization	Name	Role	Responsibilities/Interest	PM² Layer
1	UPF	Elisabet Duocastella	Solution Provider & PSC	GP Faculty Coordinator. Oversees methodology, quality of deliverables, and evaluation.	PSC / SP
2	UPF	Rebeca Calderón	Solution Provider & PSC	Academic mentor; supervises deliverables and feedback.	PSC / SP
3	UPF	Alejandro Oller	Solution Provider & PSC	GP faculty; supports planning and iteration review.	PSC / SP
4	Aigües de Barcelona	Sheila Piñol (Telelectura/Innovació)	Project Owner & PSC	Provides aggregated data, defines context, evaluates project relevance.	PO
5	AB Data Challenge	Mentoring & Logistics Team	Business Manager & PSC	Organizes competition logistics, evaluation, and mentor coordination.	BM
6	UPF (Students)	Adrià Cortés Cugat	Project Representative	Ensures effective communication of the Project Core Team. Organizes meetings, coordinates, and escalates issues when required.	RP
7	UPF (Students)	Adrià Cortés, Joan Company, Marc de los Aires, Guillem García, Jofre Geli	Project Core Team	Develop the analytical solution, documentation, and presentation.	PCT

1.4. Project Constraints / Assumptions

Project Constraints

#	Category	Description
1	Timeline	The project must strictly follow the official AB Data Challenge 2025 calendar, with all deliverables completed before the Pitch Day (January 2026). No extensions or additional development phases will be allowed.
2	Budget	No financial resources are available. All work will rely exclusively on academic infrastructure and open-source tools such as Python, Jupyter, GitHub, and Google Drive.
3	Data Access	Access to "*telelectura*" (smart-meter) datasets is limited to the competition period and subject to Aigües de Barcelona's data-sharing policy. No external or proprietary datasets can be used.
4	Mentoring Availability	Only two mentoring sessions are officially scheduled. Efficient preparation and documentation of feedback are required to maximize their impact.
5	Academic Commitments	The project must coexist with other UPF course deliverables, which constrains available working hours.
6	Work Not to Be Done (Out Scope)	The project will not include: ● Real-time integration into production systems. ● Development of full web or mobile application interfaces. ● Field deployment or physical metering management. *Only a prototype and analytical proof-of-concept will be delivered.*

Project Assumptions

#	Area	Assumption
1	Data	Telelectura data will be provided in a complete, consistent, and usable format, according to the challenge documentation.
2	Resources	All work will be conducted using open-source or freely available tools and university resources.
3	Team Commitment	Each team member will participate actively in all phases — research, development, documentation, and reporting.
4	Communication	Mentor and stakeholder communication will occur primarily through scheduled meetings and digital channels (email, Drive, WhatsApp, Zoom).
5	Supervision	UPF faculty (Solution Providers) will guide methodology and ensure compliance with the GP2526 Project Management framework.
6	Evaluation	Aigües de Barcelona will assess project outcomes based on challenge criteria (accuracy, innovation, and impact).

2. PRODUCT SCOPE

2.1. Requirements

ID	Name	Description	Category Requested by	Deliverable ID
Rq1	Data Cleaning & Validation	Implement robust preprocessing to load, validate, and clean "*telelectura*" datasets, ensuring reliability and completeness.	Functional Project Team	D1
Rq2	Feature Engineering	Create derived features capturing temporal patterns, consumption dynamics, and variability indicators.	Technical AB / Cetaqua	D2
Rq3	Anomaly Detection Model	Develop ML or statistical models capable of identifying abnormal consumption patterns (e.g., leaks, unusual peaks).	Functional AB / Cetqua	D3
Rq4	Model Evaluation & Metrics	Evaluate model performance using accuracy, precision, recall, and F1 score; include interpretability analysis.	Quality Course Faculty	D4
Rq5	Visualization & Reporting	Build a concise dashboard or visual report to highlight anomalies and insights.	Feature Project Team	D5
Rq6	Final Documentation & Presentation	Deliver a final report, presentation slides, and repository documentation summarizing the full workflow.	Deliverable Course Faculty / AB	D6

2.2. Work Breakdown Structure

Work Breakdown		
1.0		***Detection of Abnormal Consumption***
1.1		***Project Initiation***
1.1.1		*Project Core Team Definition*
1.1.2		*Challenge Selection*
1.1.3		*Project Charter*
1.1.4		*Project Work Plan v0.1*
1.1.5		*Ready for Iteration Checklist*
1.1.6		*Challenge Inscription (Participation confirmed 11 Oct)*
1.2		***1rst Iteration - Project Planning and Foundation***
1.2.1		*Requirements Definition*

1.2.2			*Follow-up Register Creation*	
1.2.3			*Stakeholder Matrix Creation*	
1.2.4			*AB Data Integration & Exploration*	
1.2.4.1				*Data Understanding and Acquisition*
1.2.4.2				*Feature Definition & Exploration Plan*
1.2.5			*Kick-off AB*	
1.2.6			*Iteration 1 Increment*	
1.2.7			*Project Work Plan Update v1.0*	
1.2.8			*Case #0*	
1.2.9			*Case #1*	
1.3		***2nd Iteration – Model Development***		
1.3.1			*Project Work Plan Update v2.0*	
1.3.2			*Follow-up Register Update*	
1.3.3			*Stakeholder Matrix Update*	
1.3.4			*Model Implementation (Training)*	
1.3.6			*Project Status Report #1 (9 Nov)*	
1.3.5			*Mentorship #1 (4 Nov)*	
1.4		***3rd Iteration – Finalisation & Delivery***		
1.4.1			*Work Plan Update v3.0*	
1.4.2			*Follow-Up Register Final Update*	
1.4.3			*Stakeholder Matrix Update*	
1.4.4			*Project Status Report #2*	
1.4.5			*Mentorship #2 (25 Nov)*	
1.4.6			*Model Evaluation & Dashboard Design*	
1.4.7			*Final Model Selection & Report Preparation*	
1.4.8			*Challenge Final Submission*	
1.4.9			*Case #3*	
1.5		***Project Closure & Communication***		
1.5.1			*Final Product Delivery*	

1.5.2			*Final Presentation*
1.5.3			*Project End Report (Dec → UPF submission)*
1.5.4			*Communication of Finalists (11 Dec)*
1.5.5			*Pitch Day Presentation (19 Dec)*

Project Initiation

1.1.1 Deliverable: Project Core Team Definition

Define the project roles, responsibilities, and internal communication flow for Team 102.D. Each member is assigned specific areas of responsibility.

Estimate: 2 hours

Responsible: Adrià Cortés

Due Date: 25 Sep 2025

1.1.2 Deliverable: Challenge Selection

Evaluate the four available challenges in the AB Data Challenge and select one as the project focus. This selection establishes the analytical scope, expected outcomes, and thematic connection with Aigües de Barcelona's Telelectura program.

Estimate: 1 hours

Responsible: Team 102.D

Due Date: 26 Sep 2025

1.1.3 Deliverable: Project Charter

Develop the initial Project Charter (v0.1) defining project objectives, scope, constraints, assumptions, and success criteria. The document aligns academic and industrial expectations and establishes the foundation for further planning.

Estimate: 2 hours

Responsible: Adrià Cortés

Due Date: 12 Oct 2025

1.1.4 Project Work Plan v0.1

Create the first version of the Project Work Plan, including preliminary WBS, milestones, resource allocation, and iteration planning.

Estimate: 2 hours

Responsible: Joan Company

Due Date: 12 Oct 2025

1.1.5 Deliverable: Ready for Iteration Checklist

Ensure that all baseline documents (Charter, PWP, Team roles) are complete and approved. This checklist validates the transition to Iteration 1.

Estimate: 2 hours

Responsible: Guillem Garcia i Jofre Geli

Due Date: 12 Oct 2025

1.1.6 Deliverable: Challenge Inscription

Complete the formal Aigües de Barcelona registration process and confirm project acceptance. Document the official participation approval received on 11 Oct 2025.

Estimate: 0.5 hours

Responsible: Adrià Cortés

Due Date: 11 Oct 2025

Iteration 1

1.2.1 Deliverable: Requirements Definition

*Identify, document, and validate all technical and functional requirements for the project. This includes defining the objectives for anomaly detection, data quality standards, and success metrics. Requirements are gathered from the **Aigües de Barcelona challenge brief**, **UPF project guidelines**, and the team's analytical goals.*

Estimate: 2 hours

Responsible: Adrià Cortés & Joan Company

Due date: 14 Oct 2025

1.2.2 Deliverable: Follow-Up Register Creation

Develop the tracking mechanism to document risks, issues, and decisions throughout the project. The register includes categories for risk type, impact, mitigation strategy, and responsible person. It is maintained in Google Drive and updated weekly after each working session and mentoring meeting.

Estimate: 2 hours

Responsible:

Due date: 17 Oct 2025

1.2.3 Deliverable: Stakeholder Matrix

Map all stakeholders across the project — Aigües de Barcelona, UPF teachers, project mentors, and Team 102.D members. Each stakeholder is classified according to ***influence****,* ***interest****, and* ***role*** *(PO, BM, SP, PCT, PST, User).*

The document will serve as the foundation for communication planning.

Estimate: 2 hours

Responsible: Jofre Geli i Joan Company

Due date: 17 Oct 2025

1.2.4 AB Data Integration & Exploration

Establish connection with ***Aigües de Barcelona*** *data resources and define the data-exploration strategy. This deliverable ensures correct data understanding, ethical handling, and initial technical validation. It is divided into two key activities*

Estimate: 97 hours

Responsible: Joan Company

Due date: 17 Oct 2025

1.2.4.1 Activity: Data Understanding & Acquisition

Access, review, and preprocess the ***Telelectura datasets*** *(2022–2024) provided by Aigües de Barcelona. Verify completeness and detect potential inconsistencies or anomalies such as negative consumptions or missing values. Summarize dataset characteristics by municipality (Barcelona, L'Hospitalet, Santa Coloma, Viladecans).*

Estimate: 48 hours

Responsible: Adrià Cortés

Due date: 24 Oct 2025

1.2.4.2 Activity: Feature Definition & Exploration Plan

Design the exploratory data analysis plan and define the key features to be extracted for anomaly detection. The feature set will include statistical descriptors (mean, variance, consumption trends), temporal patterns, and spatial aggregates. This plan will guide Iteration 2 model development.

Estimate: 48 hours

Responsible: Guillem Garcia

Due date: 24 Oct 2025

1.2.4.3 Activity: Kick-Off (Aigües de Barcelona)

Participate in the official Kick-Off (17 Oct) to synchronize expectations with Aigües de Barcelona and UPF mentors.

Confirm dataset accessibility, review data confidentiality guidelines, and align deliverable expectations for the first iteration closure.

Estimate: 1 hour

Responsible: All Team Members

Due date: 17 Oct 2025

1.2.5 Deliverable: Iteration 1 Increment

Compile all outputs from Iteration 1 — Requirements Definition, Stakeholder Matrix, Follow-Up Register, and EDA Plan — into a single progress package. This package marks the project's readiness to begin Iteration 2 (Model Development phase).

Estimate: 1 day

Responsible: Team 102.D (all members)

Due date: 24 Oct 2025

1.2.6 Deliverable: Project Work Plan Update

Revise the Project Work Plan (v0.1) based on feedback from the Project Initiation Review and Week 4 Working Session. Include updated WBS elements, refined timeline, and adjusted roles for Iteration 1. This version becomes the new baseline for project tracking.

Estimate: 1 day

Responsible: Team 102.D (all members)

Due date: 24 Oct 2025

3. Roles & responsibilities (optional)

The project follows the PM² governance model defined in the EUTOPIA Project Handbook, complemented with specific internal assignments adapted to the nature of the AB Data Challenge.

No new governance roles have been created beyond those established in the Handbook, but the Project Core Team (PCT) has internally distributed operational responsibilities to optimize coordination and accountability.

Governance Roles - External Stakeholders

Role	Assigned To	Primary Functions
Project Owner (PO)	Sheila Piñol – Aigües de Barcelona (Telelectura / Innovació)	Provides the project data and context, evaluates outcomes, and ensures alignment with Aigües de Barcelona's innovation goals.
Business Manager (BM)	AB Data Challenge Mentoring & Logistics Team	Manages competition logistics, evaluation, and mentoring coordination.
Solution Providers (SP)	Elisabet Duocastella, Rebeca Calderón, Alejandro Oller – UPF	Provide academic guidance, evaluate deliverables, and ensure methodological and management alignment with GP2526 standards.
Project Representative (RP)	Adrià Cortés Cugat	Acts as liaison between the PCT and mentors; coordinates meetings, deliverables, and communication flow.
Project Steering Committee (PSC)	Aigües de Barcelona, AB Data Challenge, UPF Faculty	Supervises the project strategically, validates scope, and authorizes iteration progress.

Project Core Team - Internal Roles

Internal Role	Responsible	Main Responsibilities
Representative / Coordinator	Adrià Cortés	Liaise with contest and course organization, oversee milestones, ensure deliverables, communications, deadlines…
Data Exploration & Feature Engineering Lead	Joan Company	Handles data preprocessing, cleaning, and creation of engineered features.
Modeling / Statistical & Machine Learning Lead	Marc de los Aires	Designs, implements, and tunes the anomaly detection model.
Visualization & Interpretation Lead	Guillem García	Develops visual reports, graphs, and dashboards to interpret results.
Integration & Quality Assurance Lead	Jofre Geli	Integrates all components, tests functionality, ensures coherence and delivery quality.

4. Communications Management

The team uses clear and simple communication channels to ensure coordination and transparency throughout the project.

Channel	Purpose	Frequency	Audience
WhatsApp	Quick coordination and reminders.	Daily	Project Core Team
Weekly Meetings	Review progress and plan next steps.	Weekly	Project Core Team
Google Drive	Store and share documents and reports.	Continuous	Team & Mentors
GitHub	Code repository and version control.	Continuous	Project Core Team
Email / Zoom	Official communication with mentors and faculty.	As Needed	Mentors & Solution Providers
Mentorship Sessions	Review progress and receive feedback.	2 Sessions Total	Mentors & Team

5. Configuration Management

Configuration management ensures all project artefacts and deliverables are versioned, organized, and traceable.

Item	Tool / Location	Versioning Method
Documents & Reports	Google Drive (/deliverables folder)	Named `Team102D.FileName.vX.Y`
Code & Scripts	GitHub repository	Branches and commit tags per iteration
Data Files	Drive `/data` folder	Date-based naming
Presentations	Drive `/reports` folder	Versioned by date and iteration