# Enhanced Multi-Bet Engine Roadmap

This document outlines the strategic roadmap for developing the Unified Multi-Code Bet Generation Engine. The project is structured into five distinct epics, each containing a series of user stories that build upon one another to deliver a complete, production-grade system.

### **Epic 1: Scaffolding the Application and Core Engine**

*Objective: Establish a robust, scalable project structure and implement foundational quantitative logic.*

* **User Story 2.1:** As the founder, I need to initialize the project environment with a clean directory structure, version control, and all necessary dependencies so that development can begin on a solid foundation.
* **User Story 2.2:** As the founder, I need to generate the core engine architecture, including the abstract BasePredictiveModel interface and the CoreEngine orchestrator, to ensure a modular and pluggable system design.
* **User Story 2.3:** As the founder, I need to implement the foundational quantitative logic for value score calculation and initial staking to form the core of the bet identification process.

### **Epic 2: Building the Data Pipeline and Feature Store**

*Objective: Build the data infrastructure required to ingest, process, and store data from various sources.*

* **User Story 1.4:** As the founder, I need to architect and deploy a two-layer Feature Store (Online/Redis, Offline/BigQuery) and define data schemas to ensure data consistency and performance.
* **User Story 1.1:** As the founder, I need to ingest market and odds data from The Odds API to provide the core pricing information for the engine.
* **User Story 1.3:** As the founder, I need to ingest granular racing statistics, including gear changes and sectional times, from The Racing API and Total Performance Data to create high-alpha racing features.
* **User Story 1.2:** As the founder, I need to ingest granular sports statistics from Sportradar to create high-alpha sports features like 'Average Ruck Speed' and 'Forward-Half Intercepts'.

### **Epic 3: Implementing the Predictive Model Suite**

*Objective: Develop the architectural skeletons for all specialized predictive models.*

* **User Story 2.1 (Racing):** As the founder, I need to create the RacingConditionalLogitModel class skeleton to handle multi-runner racing predictions.
* **User Story 2.2 (Sports):** As the founder, I need to create the SportsCatBoostClassifier class skeleton for team-based sports predictions.
* **User Story 2.3 (Player Props):** As the founder, I need to create the PlayerTriesNBModel class skeleton for count-based player prop predictions.
* **User Story 2.4 (Time-Series):** As the founder, I need to create the PlayerDisposalsLSTMModel class skeleton to capture time-series dynamics in player performance.

### **Epic 4: Engineering the Advanced Multi-Bet Engine**

*Objective: Implement the sophisticated quantitative logic for correlation modeling and dynamic staking.*

* **User Story 3.1 & 3.2:** As the founder, I need to implement a quantitative correlation engine, using a Student's t-Copula, to accurately price Same-Game Multis by modeling the dependence between outcomes.
* **User Story 3.3:** As the founder, I need to implement dynamic Fractional Kelly staking, which adjusts the stake size based on a model's confidence score for a given bet, to optimize capital allocation.

### **Epic 5: Establishing the Continuous Improvement Framework**

*Objective: Build the MLOps and validation frameworks to ensure the project's long-term viability and performance.*

* **User Story 4.1:** As the founder, I need to automate the logging and calculation of Closing Line Value (CLV) for every recommended bet to have a definitive KPI for model performance.
* **User Story 4.2:** As the founder, I need to integrate model explainability (XAI) using SHAP to understand model predictions and feed a confidence score into the dynamic staking engine.
* **User Story 4.3:** As the founder, I need to scaffold an automated retraining pipeline to combat model drift and ensure the predictive models adapt to evolving market conditions.