# Adjusted Group 4 Project Proposal (Post-Feedback Version)

## Project Title

SafeBristol – AI Crime Forecasting & Risk Mapping Tool

## 1. Project Overview

Bristol, like many urban cities, experiences fluctuating crime rates across its neighborhoods. Students, residents, and newcomers often lack access to real-time, localized insights to help guide their safety-related decisions.  
SafeBristol is a prototype solution focused on predicting crime patterns using machine learning and visualizing crime hotspots via an interactive map interface. The MVP (Minimum Viable Product) will deliver a working prediction model and an intuitive crime heatmap.  
Rather than building a full mobile application from scratch, this stage of the project will focus on core functionality that can later be exposed through APIs or used in other apps.

## 2. Refined Objectives

- Develop and evaluate machine learning models (e.g., Random Forest, XGBoost) for forecasting crime risks in Bristol.  
- Create an interactive crime heatmap dashboard showing predicted hotspots using open crime datasets and mapping tools.  
- Ensure predictions are interpretable and ethically sound, with a focus on user trust and fairness.  
- Optional: Provide basic location-based risk look-up through a simple web interface or REST API.

## 3. Problem Statement

- No readily available tool currently forecasts neighborhood-level crime risk in Bristol.  
- Lack of clear, real-time crime heatmaps for students, residents, and local authorities.  
- Crime data exists but isn't easily digestible or actionable for the public or city planners.

## 4. Key Features (Refocused Scope)

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| Feature | Description |
| Crime Prediction Model | Uses machine learning models (Random Forest/XGBoost) to forecast future crime risk based on time, location, and historical data. |
| Interactive Heatmap | Displays predicted crime levels in different neighborhoods using real data (UK Police API). |
| Minimal Frontend / Dashboard | Simple map-based visualization using tools like Plotly Dash, Leaflet.js, or Streamlit. |
| API Readiness (Optional) | Model endpoints could be exposed via Flask or FastAPI, enabling future integration with mobile apps or smart city platforms. |

## 5. Deferred / Optional Features (Post-MVP or Future Work)

These features will not be implemented in this project phase but could be considered in future iterations:  
- Crowdsourced reporting via mobile app (raises ethical implications, requires formal approval).  
- Real-time push notifications for safety alerts.  
- Route recommendation and public transport integration.  
- Full mobile app deployment.

## 6. Data Sources

- UK Police API  
- Bristol City Council safety reports  
- ONS Crime Data  
- UK Met Office for weather-crime correlation analysis

## 7. Technology Stack

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| Layer | Tools |
| ML | Python, Scikit-learn, XGBoost, Pandas, Jupyter |
| Data Viz | Plotly, Folium, Streamlit / Dash / Leaflet |
| Backend (Optional) | Flask or FastAPI |
| Version Control | GitHub |
| Project Management | Trello, Blackboard Wiki |

## 8. Project Timeline (Agile-Inspired)

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| --- | --- | --- |
| Phase | Task | Timeframe |
| 1 | Data Collection & Cleaning | 1–2 Weeks |
| 2 | ML Model Development & Evaluation | 3–4 Weeks |
| 3 | Heatmap Dashboard / Visualization | 2 Weeks |
| 4 | Testing & Documentation | 1–2 Weeks |
| 5 | Optional API Setup | 1 Week |

## 9. Expected Outcomes

- A functioning ML model that forecasts crime risk by location and time.  
- An interactive, easy-to-use crime heatmap dashboard.  
- A report evaluating model performance, fairness, and ethical design.  
- Optional: A simple Flask API or Streamlit app interface.

## 10. Ethical Considerations

- Bias & Fairness: Actively monitor for and mitigate bias in data/model.  
- Privacy: No personal data will be used. All datasets are anonymized/public.  
- Transparency: Clear explanation of model predictions and limitations.  
- Responsible Communication: Avoid stigmatization of specific areas.

## 11. Innovation & Related Work

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| --- | --- |
| Tool/Project | Our Improvement |
| StreetSafe UK | Adds predictive analytics + visual heatmaps. |
| UK Police API | Enhances raw data with ML insights. |
| WalkSafe | Focuses on historical crime; we forecast future risks. |

## 12. Future Vision

If successful, the core SafeBristol system can be:  
- Integrated into a full mobile app.  
- Used by UWE, local councils, or NGOs for public safety planning.  
- Expanded to other UK cities using transferable models.

## 13. Conclusion

SafeBristol’s refined focus centers on predictive analytics and data visualization, making it achievable within the project’s timeframe. By narrowing the scope, the team ensures high-impact outcomes while setting a strong foundation for future expansion — all while aligning with ethical best practices and local community needs.