

Research Proposal: Integrating Fragmented Personal Data into Explained Daily Run Planning for Recreational Runners

Independent Project (ACCA6020)

Software Engineering

Kawam de Oliveira

2412430@student.uwtsd.ac.uk

21 October 2026.

Table of Contents

1. Introduction.....	1
2. Background to the Research and Literature Review.....	2
3. Research Problem Statement	2
4. Aim and Objectives.....	3
5. Research Methodology	3
5.1 Research Design.....	3
5.2 Resources and Materials	4
6. Project Planning	5
7. References.....	6

List of Figures

Figure 1. Project schedule (created in Tom's Planner).	5
--	---



1. Introduction

The project sits within consumer health and fitness technology, where mobile applications and wearable devices support everyday physical activity. In a survey of 232 recreational runners in Wales, 97% relied on digital technology to track their training [1].

The motivation for this project originates from a practical difficulty experienced by the author, a recreational runner in Swansea. The activity applications used by the author record training data but do not relate it to the weather forecast or to personal availability. Deciding when to run therefore requires the manual cross-referencing of separate applications, and research in personal informatics confirms that self-tracking tools remain isolated from one another [2].

The weather is central to this decision. Poor weather is known to reduce outdoor physical activity, yet current electronic coaching systems are reported to overlook it when tailoring advice [3]. The proposed iOS application will address this gap by suggesting suitable times to run from the forecast, the calendar, the planned training and the meals entered by the user, with an explanation for each suggestion. Privacy is a further motivation, since information recorded by fitness trackers belongs to the special categories of personal data under the United Kingdom General Data Protection Regulation [4]. All health data will therefore remain on the device.



2. Background to the Research and Literature Review

Personal informatics, the study of systems that help people collect and reflect on personal data, has become an established field. A review of this literature showed that 32% of the publications examined dealt with combining data held in different tools and devices, and found that the separation between self-tracking tools remains a lasting obstacle [2]. Recreational runners reflect this pattern. Most track their training digitally, younger and less experienced runners tend to combine several applications, and current tools were judged of limited practical value for preventing and managing injuries [1]. These studies describe the problem but do not test a solution that brings the data together for a concrete daily decision.

A review of 89 publications on sports recommender systems found training recommendation to be the most frequent scenario, but also that few systems combine several elements of an athlete's routine, such as training and nutrition, in a single recommendation, and that little attention is given to explaining why a recommendation is made [5]. Weather-aware recommendation is also uncommon [5]. A recent electronic coaching system suggests indoor or outdoor activities from weather data and explains each output of a machine learning model after the prediction [3]. The reported accuracy of 99.1% deserves caution, since the classifier learned rules written by the authors themselves and was validated only under Nordic conditions. The described inputs are also restricted to the weather, without personal availability, planned training or meals.

Privacy remains a persistent concern. A cross-sectional analysis of 20,991 health applications found that 88% included code able to gather information about users, mostly on behalf of third parties, while 28.1% offered no privacy policy [6]. Given the sensitive status of fitness data under United Kingdom law [4], local processing on the device reduces exposure by default.

Usability expectations are also high. A meta-analysis of System Usability Scale results reported a mean of 83.28 for physical activity applications, well above the general benchmark of 68 [7], which sets a demanding standard for any new application in this domain.

The literature therefore reveals fragmented personal data, few explained or weather-aware recommendations and persistent privacy risk, yet no reviewed study combines weather, calendar availability, planned training, running history and meals into one explained daily decision processed on the device. This gap motivates the proposed research.

3. Research Problem Statement

Recreational runners still decide when to run by checking the forecast, the calendar and activity records separately [1][2]. Recommender and coaching systems seldom combine these sources or explain their suggestions [5], the closest study relies on weather alone [3], and many health applications share data



with third parties [6]. Within personal informatics, this study examines whether an explained, weather-aware suggestion processed on the device can support this decision.

4. Aim and Objectives

The aim is to design, develop and evaluate an iOS application that suggests and explains running times from the forecast, free calendar slots, planned training and a weekly meal planner that tracks meal times, and connects these sources with running metrics in a single dashboard, keeping personal data on the device. The deadline for each objective follows the Gantt chart in Section 6.

1. Analyse runner needs through the literature and a questionnaire with 8 to 12 participants, delivering prioritised requirements.
2. Design and develop a rule-based suggestion engine, verified by automated tests with historical forecasts.
3. Design and develop the interface, notifications and local storage, delivering a prototype.
4. Evaluate the application through a six-week author diary, a second questionnaire and, if distribution allows, a field test with the System Usability Scale [7], delivering an evaluation report.

5. Research Methodology

5.1 Research Design

The project follows a product development design, with the application built incrementally and evaluated against the objectives. Two alternatives were considered. A controlled comparison with existing tools was rejected because several potential participants live abroad, which prevents in-person sessions. Manufacturer services for workout data were rejected in favour of HealthKit, which reads data from any connected watch or application on the device without a server.

Development follows Scrumban, combining weekly sprints with a Jira board limited to two tasks in progress. Evidence indicates that hybrid processes are common and that selected practices matter more than the method label [8]. Requirements are prioritised with the MoSCoW (Must, Should, Could and Won't) method inside fixed timeboxes, so that scope rather than the deadline absorbs any delay [9].

Data collection follows the objectives. For the first objective, a Microsoft Forms questionnaire asks runners how they choose when to run and which tools they consult. For the second, historical forecasts from the Open-Meteo archive [10] provide reproducible inputs with known outcomes for automated tests, while the rule for duplicated workouts is checked against the author's records. For the third, integration tests on the author's iPhone follow documented manual cases. For the fourth, the author keeps a structured diary for six weeks, recording each suggestion, the decision taken and the reason,



triangulated with application records [11]. A second questionnaire presents interface mock-ups created in Figma. If test distribution is granted, participants then use the application for one to two weeks on their own devices and complete the System Usability Scale.

Scale responses and usability scores will be summarised with means, standard deviations and medians, following a published reporting format for digital health applications [7]. The general benchmark of 68 is the primary reference, and the mean of 83 for physical activity applications serves only for context, since this application does not record activity. With eight or more field participants, a one-sample Wilcoxon signed-rank test against 68 will be run for exploratory purposes. Open answers and diary entries will be analysed thematically. Success requires all Must requirements to be verified and all automated tests to pass.

Ethical approval will be obtained before any recruitment. Participants will be adults, give informed consent, be identified by codes from P1 to P12 and be able to withdraw. Interviews will be recorded through notes only. Health data will remain on each participant's device, and only workout, distance, heart rate and energy data will be requested, in line with special category obligations [4] and Apple rules that forbid the use of health data for advertising [12]. The main risks are the lack of test distribution, mitigated by an evaluation limited to the author, recruitment below eight, mitigated by descriptive analysis, and loss of the weather service, mitigated by a local cache and stored test forecasts.

A convenience sample of acquaintances and a diary kept by a single author limit generalisation, and author bias will be declared. Reliability derives from repeatable tests with stored forecasts, and validity from triangulation between the diary, application records and questionnaire responses.

5.2 Resources and Materials

The application is written in TypeScript with React Native and Expo in Visual Studio Code and compiled with Xcode for the author's iPhone, which receives Garmin workouts through HealthKit. A free Apple developer account permits HealthKit access [13]. EventKit, SQLite and local notifications run on the device, and Jest automates testing. Forecasts come from Met Office models through Open-Meteo [14], free for non-commercial use without an access key [15]. Figma, draw.io, Jira and Microsoft Forms support interface design, software modelling, planning and questionnaires, while TestFlight distribution depends on a university developer account. Journals are accessed through the university library, including IEEE Xplore and the ACM Digital Library.



6. Project Planning

Figure 1 presents the schedule by objective, with assessment milestones and resource use over time. Work proceeds in weekly sprints tracked in Jira, and the chart will be revised before the interim viva. The first questionnaire depends on ethical approval, and one month between the analysis and the report deadline provides contingency. Without test distribution, the field test period reinforces the analysis. The deliverables are the requirements specification, the source code with automated tests, design diagrams, the evaluation report and the final report.

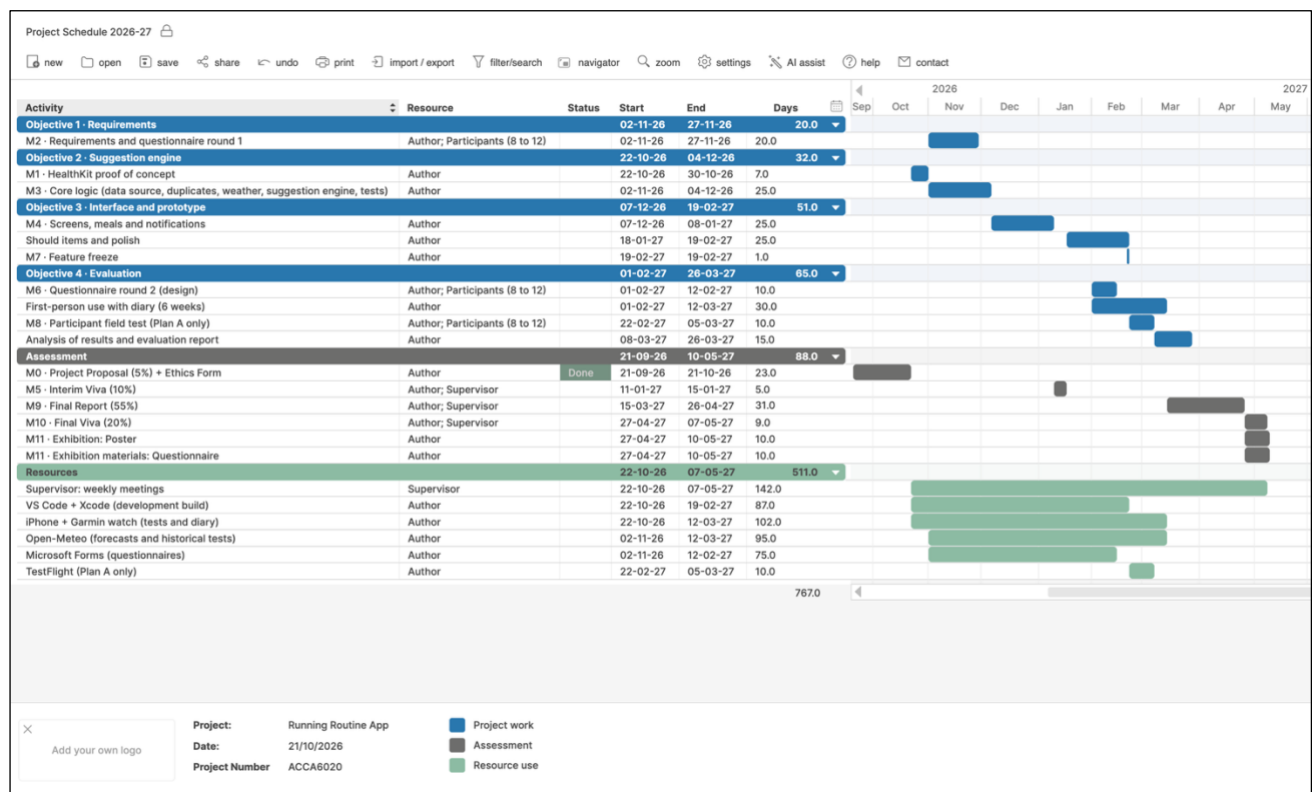


Figure 1. Project schedule (created in Tom's Planner).



7. References

- [1] K. Walker, N. Phillips, and L. Sheeran, “Exploring the Use of Digital Technology for Injury Prevention and Self-Management Among Recreational Runners,” *Physical Therapy in Sport*, vol. 71, pp. 85–91, Dec. 2024, doi: 10.1016/j.ptsp.2024.12.004.
- [2] D. A. Epstein *et al.*, “Mapping and Taking Stock of the Personal Informatics Literature,” *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, vol. 4, no. 4, pp. 1–38, Dec. 2020, doi: 10.1145/3432231.
- [3] A. Chatterjee and N. Avazov, “Contextual Recommendation Modeling in eCoaching With Machine Learning, X-AI, and Semantic Ontology,” *Frontiers in Digital Health*, vol. 8, Jul. 2026, doi: 10.3389/fdgth.2026.1811976.
- [4] Information Commissioner’s Office, “What Is Special Category Data?,” ico.org.uk. [Online]. Available: <https://ico.org.uk/for-organisations/uk-gdpr-guidance-and-resources/lawful-basis/special-category-data/what-is-special-category-data>. [Accessed: Oct. 21, 2026]
- [5] A. Felfernig, M. Wundara, T. N. T. Tran, V.-M. Le, S. Lubos, and S. Polat-Erdeniz, “Sports Recommender Systems: Overview and Research Directions,” *Journal of Intelligent Information Systems*, vol. 62, no. 4, pp. 1125–1164, May 2024, doi: 10.1007/s10844-024-00857-w.
- [6] G. Tangari, M. Ikram, K. Ijaz, M. A. Kaafar, and S. Berkovsky, “Mobile Health and Privacy: Cross Sectional Study,” *BMJ*, vol. 373, no. 8296, p. n1248, Jun. 2021, doi: 10.1136/bmj.n1248.
- [7] M. Hyzy *et al.*, “System Usability Scale Benchmarking for Digital Health Apps: Meta-Analysis,” *JMIR mHealth and uHealth*, vol. 10, no. 8, Aug. 2022, doi: 10.2196/37290.
- [8] M. Kuhrmann *et al.*, “What Makes Agile Software Development Agile?,” *IEEE Transactions on Software Engineering*, vol. 48, no. 9, pp. 3523–3539, 2022, doi: 10.1109/tse.2021.3099532.
- [9] DSDM Consortium, “The DSDM Agile Project Framework,” 2014. [Online]. Available: <https://www.agilebusiness.org/wp-content/uploads/2026/05/DSDM-Agile-Project-Framework-Handbook.pdf>. [Accessed: Oct. 21, 2026]
- [10] Open-Meteo, “Historical Forecast API | Open-Meteo.Com,” Open-meteo.com. [Online]. Available: <https://open-meteo.com/en/docs/historical-forecast-api>. [Accessed: Oct. 21, 2026]
- [11] A. Desjardins, O. Tomico, A. Lucero, M. E. Cecchinato, and C. Neustaedter, “Introduction to the Special Issue on First-Person Methods in HCI,” *ACM Transactions on Computer-Human Interaction*, vol. 28, no. 6, pp. 1–12, Dec. 2021, doi: 10.1145/3492342.



- [12] Apple Inc., “App Store Review Guidelines - Apple Developer,” developer.apple.com. [Online]. Available: <https://developer.apple.com/app-store/review/guidelines/>. [Accessed: Oct. 21, 2026]
- [13] Apple Inc., “Supported Capabilities (iOS) - Reference - Account - Help - Apple Developer,” developer.apple.com. [Online]. Available: <https://developer.apple.com/help/account/reference/supported-capabilities-ios>. [Accessed: Oct. 21, 2026]
- [14] Open-Meteo, “UK Met Office API | Open-Meteo.Com,” Open-meteo.com. [Online]. Available: <https://open-meteo.com/en/docs/ukmo-api>. [Accessed: Oct. 21, 2026]
- [15] Open-Meteo, “Terms | Open-Meteo.Com,” Open-meteo.com. [Online]. Available: <https://open-meteo.com/en/terms>. [Accessed: Oct. 21, 2026]
- Google Translate, private communication, 2026. [Accessed: Oct. 2026].
- Anthropic’s Claude, private communication, 2026. [Accessed: Oct. 2026].

