# Team 9
# Developing a Personalized Health and Fitness Coach
# Phase I

**Prompt**: Develop a health and fitness app that uses generative AI to create personalized workout plans, nutritional advice, and wellness recommendations based on user data.

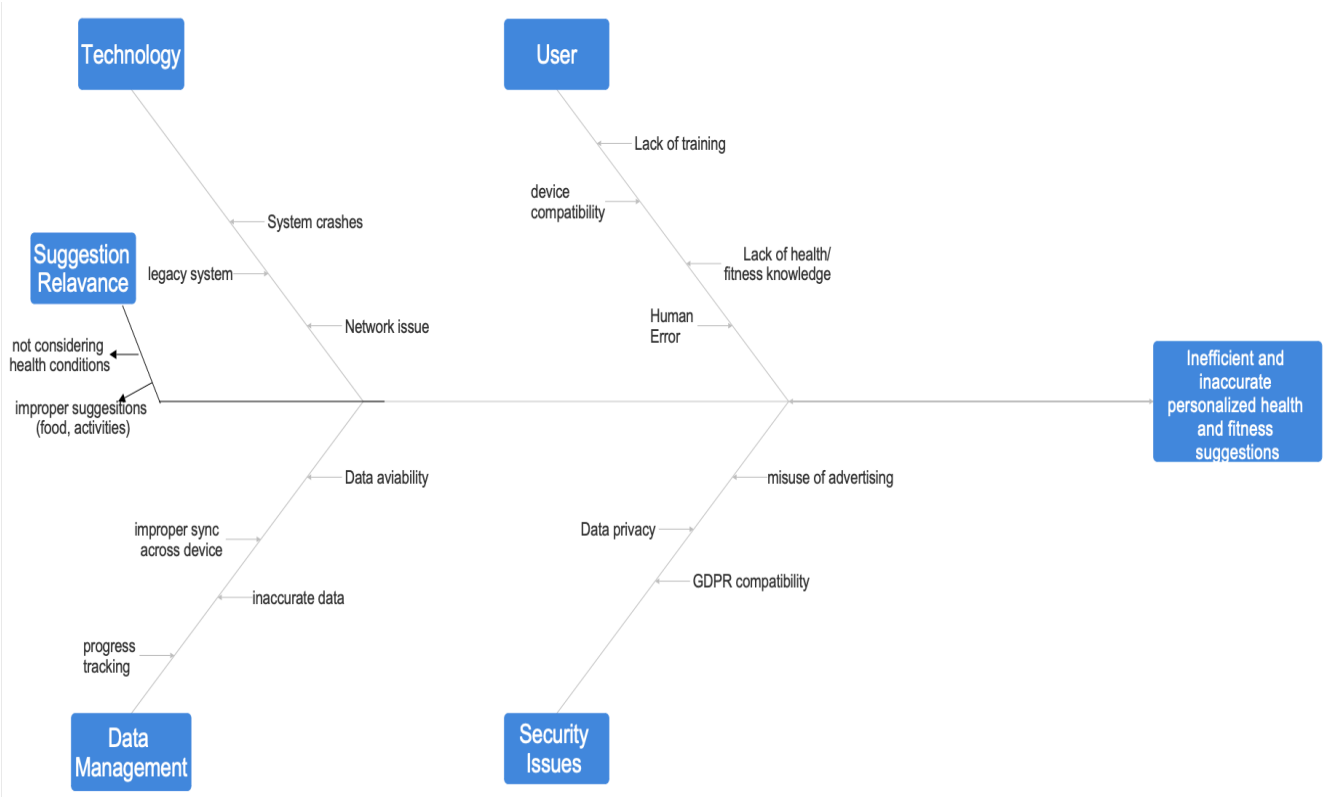
## Mission Statement

*Helping fitness enthusiasts around the world achieve their health goals.*

## Problem Statement

*Leveraging GenAI to provide an all-in-one solution for personalizing fitness, nutrition and wellness plans, each tailored to the specific needs of the customer.*

## Fishbone Diagram illustrating deeper understanding of the problem



## Scope, Goals and Constraints

### Short-term:

1. Increase avg. baseline user fitness by generating categorized workout plans based on individual goals and limitations in order reach within 15% of target BMI:
    - *Lean+*: For weight loss and “toning down”
    - *Grow+*: For weight gain and “bulking up”
    - *Sustain+*: For maintenance and “upkeep”

   ***Type constraint:*** *Present, Internal and Mandatory*
   ***Value constraint:*** *Only consider age range 16-65 when calculating avg. baseline fitness*

2. Suggest a minimum of 3 nutritional plans by considering user goals and plan preference in order to sufficiently support planned activity
   ***Type constraint:*** *Present, Internal and Mandatory*
   ***Value constraint:*** *Ingredients must be locally available*

3. Boost user engagement by setting up daily wellness reminders/notifications encouraging users to consistently follow their workout plan at least 3 to 4 times a week for a minimum of 4 weeks.
   ***Type constraint:*** *Present, Internal and Mandatory*
   ***Value constraint:*** *Only show notifications/alerts within 5 mins before earliest activity 5 mins and after latest activity*

4. Accurately display user fitness metrics in the form of a dashboard in order to track progress and ensure 60% increase in self-assessed rating
    - Weight, Height, Age, Gender
    - Steps walked and est. calories burned
    - Sleep schedule (wake/sleep)

   ***Type constraint:*** *Present, Internal and Mandatory*
   ***Value constraint:*** *Only 4 metrics visualized at a time*

5. Increase language support to cater to a wider variety of people and groups
   ***Type constraint:*** *Present, Internal and Mandatory*
   ***Value constraint:*** *Up to 5 major languages*

### Long-term:

1. Increase external integrations with 3rd party apps in order to improve user experience
    - Pedometer (step counter, integration with Apple Watch, Garmin)
    - Food logger (option to scan ingredient label and calculate calories)
    - Timer for HIIT workouts (color and work/rest duration customization)

   ***Type constraint:*** *Future, External and Desirable*
   ***Value constraint:*** *support for 3 major integrations*

2. Ensure continued compliance with health and safety regulations in order to stay available, legal and secure
   ***Type constraint:*** *Future, External and Mandatory*

***Value constraint:*** *None*

3. Updating content based on user fitness trends in order to stay relevant with changing user preferences and demographics
   ***Type constraint:*** *Future, External and Desirable*
   ***Value constraint:*** *None*

4. Calculate and project the following fitness metrics to continue encouraging user engagement and fitness discipline:
   - Estimated to goal physique based on current data
   - Personal bests (through badges)
   - Progress levels and internal competitions between friend groups

   ***Type constraint:*** *Future, Internal and Mandatory*
   ***Value constraint:*** *Max 20 participants in a friend group*

5. Assess user satisfaction through in-built surveys and star-rating boxes in order to achieve an overall customer satisfaction rating of 4-4.5 on a scale of 5.
   ***Type constraint:*** *Future, Internal and Mandatory*
   ***Value constraint:*** *Consider surveys only from verified users with app usage >10 days*

**Discovery / Facts**

1. **Observe operations:**
   Gathered information from other fitness apps. Assessed how they collected user information such as height, weight, age, and their preference place to workout. From what we observed, it is not user friendly and very complicated to navigate. It lacks places to ask if customers have any questions that arise such as how to do the exercise.

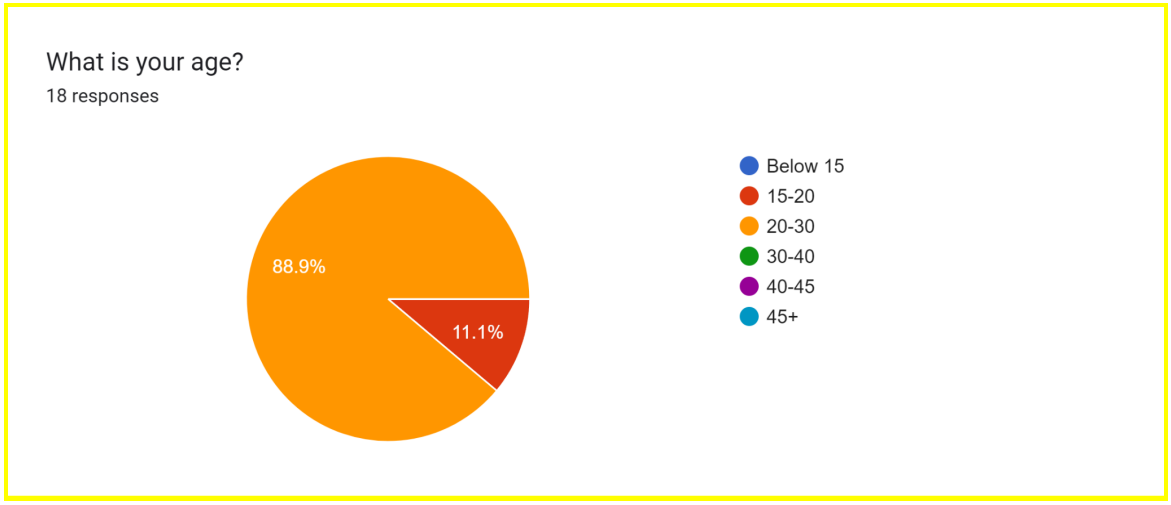
2. **Conduct interviews:**
   In order to gain insights on the usage and the compatibility of the fitness app, a general peer interview was conducted with a group of gym enthusiasts. While the technical glitches being the main drawbacks of the app, the key advantages are as follows:
   - Reminders and the tracking aspects of the app provided constant motivation and kept them accountable.
   - The workouts were modified to one's fitness level and the easy access to those kept things interesting as well as challenging.
   - The personalized aspects of the app like the exercise modifications and techniques were helpful for safe and efficient workout sessions.

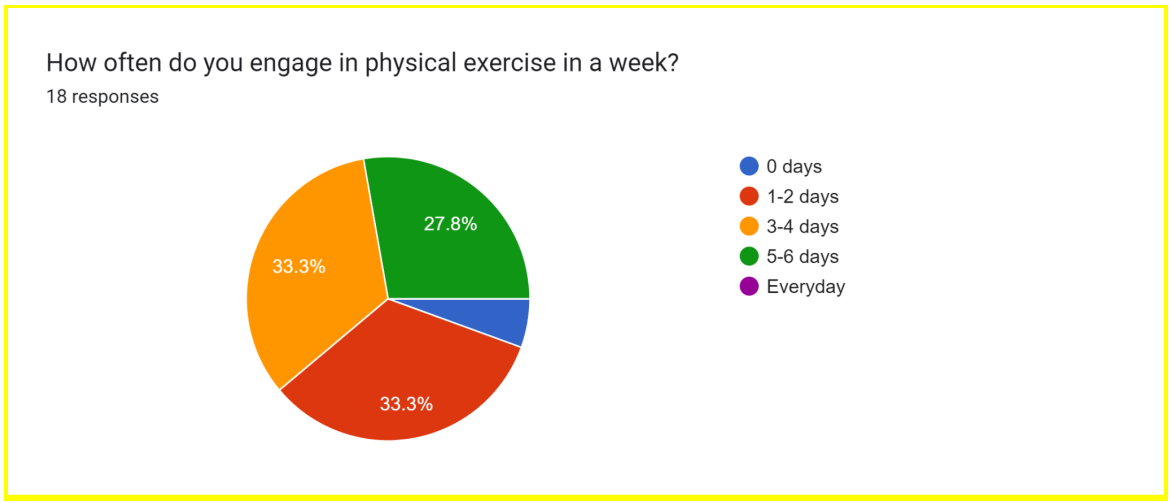
   Overall, they mentioned how the app's integration of all required resources into a single platform expedited their fitness journey. Consequently, it will be simpler for them to maintain consistency and meet their fitness goals.

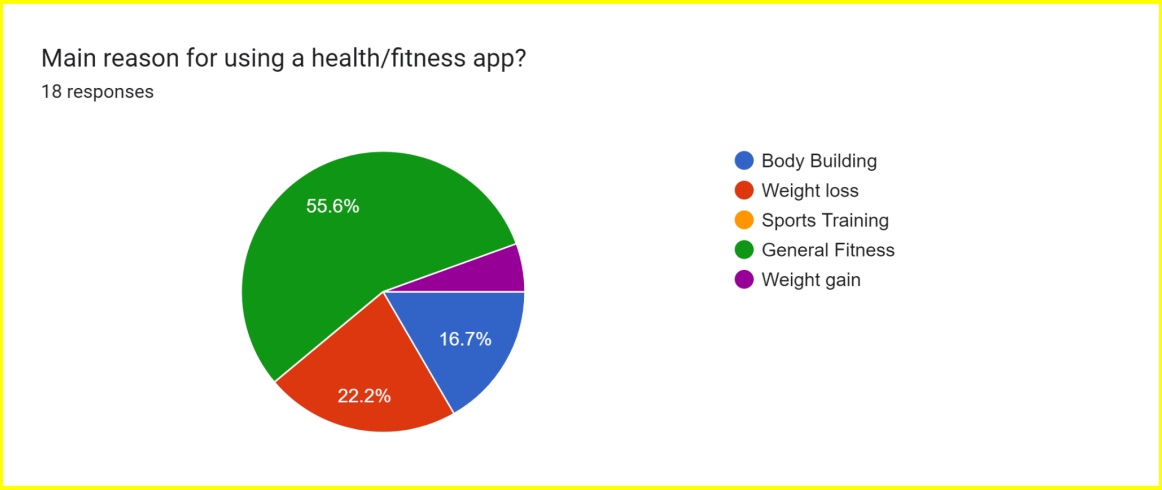
3. **Conduct a user survey:**
   The feedback gathered from users of the fitness app based on the survey showed a mix of experiences and areas that could be better. Most users, aged, between 20 and 30, regularly participated in activities for reasons like building muscle and staying fit. Users appreciated features such as workout reminders, overall fitness assessments and support along their fitness journey. On the other side they mentioned concerns about data accuracy with improper step/calorie

tracking. Suggestions for improvement included improving the application interface and adding tools, like a calorie tracker to offer a better fitness experience.

Statistics and raw data for 18 responses received are below:






| **Main reason for using a health/fitness app?** | **How was your experience with the fitness app? What worked well** | **What didn't work well?** | **What features or improvements would you like in a fitness app?** |
|---|---|---|---|
| Bodybuilding | Reminder to complete the daily physical exercise | Sometimes inaccurate data | Improve UI of the app |
| General Fitness | The overall understanding of fitness levels helped hit my fitness goals | The TDEE calculations were usually off on my devices | Adding calorie intake tracker as well |
| General Fitness | The thing which worked well is that It helps in measuring the total distance traveled. | The fitness App sometimes measures the wrong reading of foot steps count. The individual cannot completely depend on the readings of fitness well. | The accurate readings of foot steps and calories count. |
| General Fitness | It was good. It guided me throughout the journey | Everything worked | No improvement |
| General Fitness | Really good with the training part. 1-1 personal coaching was really good. | Didn't like the call spamming my marketing. | Posture and form analyser while doing exercises. |
| General Fitness | The fitness app helps me to keep track of my calories intake and suggests exercise that adapts my body. | Sometimes data are irrelevant to my fitness goal | Live monitoring and alerts. |
| General Fitness | Tracking the workouts I did | Repeated workouts. | To update the workouts and features time to time |

| | | | |
|---|---|---|---|
| General Fitness | The design of the application was good, the animations of the exercises were good. | Consistency | Daily reminders, information about the number of hours we have worked out, suggestions on working out more would be good. |
| Weight loss | Regularly following the instructions | Not following the workout plan | Regular scheduled workout and reminders |
| General Fitness | Health tracking made easy | Added some manual works | Better integration with fitness wears |
| Weight loss | It was good. I mainly used it for personalized workout plans and nutrition tracking. | - | Integrating more healthy features |
| Weight gain | Nothing | Couldn't gain weight | Better UI |
| Weight loss | I could use that even in my busy life and also easy to use | Nothing | Motivation to do it and follow it |

4. **Analysis of existing open documentation:**
   Four research papers were analyzed for relevant information regarding app functionality most important to users, existing release schedules, potential benefits and finally general usability concerns. Below is a list of the data gathered from each paper respectively:

   **Factors Related to Sustained Use of a Free Mobile App for Dietary Self-Monitoring With Photography and Peer Feedback: Retrospective Cohort Study [2]**
   - “Incorporating additional self-regulation techniques such as goal-setting and intention formation into the app could potentially increase user engagement and promote sustained use.” [2]
   - “The use of technology helps to change behavior by improving both technical knowledge and experience towards achieving achievements, a fact that occurs when using the application in the visualization and development of training.” [7]
   - Example of existing release schedule: “Altogether 189,770 users downloaded and used the Eatery app, The Eatery, at least once between October 15, 2011, and April 3, 2012. During this time, they generated 429,288 pictures and 7,946,447 ratings.” [2][6]


- User dietary preferences from the *Eatery* [2][6] fitness app experiment:

| **“How do you eat?”** | **Category** | **Number of users, n (%) n=189,770** |
|---|---|---|
| Not defined | Not defined | 80,118 (42.22%) |
| “I eat everything!” | Everything | 87,912 (46.33%) |
| “Low fat” | Strict | 7778 (4.10%) |
| “Low carbs, no carbs, or paleo” | Strict | 7146 (3.77%) |
| “Vegan or vegetarian” | Strict | 6223 (3.28%) |
| “Complex carb diet” | Other | 2388 (1.26%) |
| “Other” | Other | 2427 (1.28%) |

| | | |
|---|---|---|
| “Gluten free” or “gluten free” | Other | 229 (0.12%) |
| None of the above | Other | 1714 (0.90%) |
| Total | Strict | 17,025 (8.97%) |
| Total | Other | 4715 (2.48%) |

**The Promotion of Physical Activity from Digital Services: Influence of E-Lifestyles on Intention to Use Fitness Apps [5]**

- “Spain is one of the countries with the highest market penetration in the fitness sector, having created chains of Boutique fitness centers.” [5]
- “Positioning [in the market] is due to the high personalization of its services, a highly individualized study of the client’s objectives, and a team of professionals specialized in physical activity, who design programs based on the physical characteristics of the client and help users find their objectives in a personalized way.” [5]
- “To track and prescribe training in a digital format, the chain of Boutique fitness centers uses an App from a university spin-off called Fitbe. This App allows the visualization of the exercises, the realization of directed classes in streaming and the interaction with clients through video calls.” [5]
- Factors affecting fitness app usage and their importance [5]:

| | **Normality US/K** | **CFA Loadings** | **CR** | **AVE** |
|---|---|---|---|---|
| **Factors/Items** | | | | |
| **Fashion Consciousness** | | | 0.81 | 0.59 |
| FA1. Design is the most important factor in choosing electronic products | −0.18/−0.93 | 0.68 | | |
| FA2. When I must choose between the two I usually buy an electronic device | −0.31/−0.82 | 0.93 | | |
| FA3. I often buy the latest model in electronic products | −0.05/−1.13 | 0.66 | | |
| **Leisure Orientation** | | | 0.75 | 0.50 |
| LO5. I would rather enjoy leisure time than work hard | −0.35/−0.99 | 0.61 | | |
| LO6. Leisure is worth the extra money spent for it | −1.19/0.89 | 0.75 | | |
| LO7. I thoroughly enjoy my leisure time | −1.43/1.94 | 0.75 | | |
| **Internet Involvement** | | | 0.75 | 0.51 |
| II8. I spend less time watching TV because of the Internet | −0.48/−0.84 | 0.68 | | |
| II9. I am doing more shopping on the Internet than before | −0.79/−0.61 | 0.76 | | |
| II11. I trust information on Web sites that I have heard about | −0.04/−0.56 | 0.69 | | |
| **E-Shopping Preference** | | | 0.80 | 0.50 |
| ESP12. I think online buying is a novel, fun way to shop | −0.45/−0.45 | 0.78 | | |
| ESP13. E-shopping is easier than local shopping | −0.06/−0.96 | 0.69 | | |

| | | | | |
|---|---|---|---|---|
| ESP14. I like browsing on the Internet | −1.02/0.53 | 0.71 | | |
| ESP15. I think e-shopping offers lower prices than local stores | −0.49/−0.42 | 0.63 | | |
| ESP16. I enjoy buying things on the Internet | −0.23/−0.79 | 0.77 | | |
| ESP18. I think e-shopping offers a better selection than local stores | −0.11/−0.89 | 0.60 | | |
| **Perceived Ease of Use** | | | 0.97 | 0.89 |
| PEU1. Fitness Apps are easy to use | −0.84/0.58 | 0.89 | | |
| PEU2. Learning to use fitness Apps is easy | −1.03/1.20 | 0.92 | | |
| PEU3. Interaction with fitness Apps is clear and understandable | −0.85/0.63 | 0.96 | | |
| PEU4. It is easy to interact with fitness Apps | −0.84/0.71 | 0.97 | | |
| **Perceived Usefulness** | | | 0.93 | 0.77 |
| PU1. Using fitness Apps improves my exercise experience | −0.32/−0.33 | 0.83 | | |
| PU2. Using fitness Apps enhances my effectiveness in doing exercises | −0.08/−0.37 | 0.86 | | |
| PU3. Using fitness Apps increases my productivity in doing exercises | −0.09/−0.45 | 0.93 | | |
| PU4. Using fitness Apps is useful for doing exercises | −0.32/−0.46 | 0.87 | | |
| **Attitude Toward Fitness Apps** | | | 0.91 | 0.71 |
| AT1. Using fitness Apps is a good idea | −0.80/0.71 | 0.78 | | |
| AT2. I intend to use fitness Apps in my fitness center | −0.51/−0.39 | 0.82 | | |
| AT3. Fitness Apps make the physical activity more interesting | −0.25/−0.61 | 0.87 | | |
| AT4. I like doing physical activity with fitness Apps | −0.13/−0.72 | 0.87 | | |
| **Intention to Use** | | | 0.96 | 0.86 |
| IU1. I will use fitness Apps on a regular basis in the future | −0.19/−0.58 | 0.94 | | |
| IU2. I will frequently use fitness Apps in the future | −0.09/−0.49 | 0.94 | | |
| IU3. Assuming I have access to fitness Apps, I intend to use them | −0.55/−0.23 | 0.92 | | |
| IU4. Given that I have access to fitness Apps, I predict that I would use them | −0.48/−0.24 | 0.91 | | |

**Determinants of Fitness App Usage and Moderating Impacts of Education-, Motivation-, and Gamification-Related App Features on Physical Activity Intentions: Cross-sectional Survey Study [3]**

- “Habit and performance expectancy were found to be the most important predictors of intention to use fitness apps, consistent with prior studies. Positive relationships have also been identified for effort expectancy, facilitating conditions, and price value.” [3]
- “The results showed that habit and performance expectancy were the two strongest predictors of intentions of individuals to use fitness apps.” [3]
- “The effects of performance expectancy were greater when motivation-related features were rated as important and when education-related features were rated as less important.” [3]
- “The effects of performance expectancy were greater for males.” [3]

- "The effects of habit were greater when education-related features were rated as important and when motivation-related features were rated as less important. Furthermore, the effects of habit were greater for females. Age moderated the relationship between effort expectancy and app usage intention. The intentions of individuals to use fitness apps predicted their intentions of being physically active, using two different means of measuring future physical activity." [3]

**Healthcare in the Pocket: Mapping the Space of Mobile-Phone Health Interventions [4]**

- "One common form of this strategy is to make reminders and informational messages more engaging by interspersing them with other interesting or amusing non-health-related content. For instance, both Armstrong *et al.*'s text messaging intervention for sun screen application and Rodgers *et al.*'s smoking cessation intervention sent their participants messages with fun content—such as weather forecasts, jokes, sports scores, or interesting local news—in addition to health messages." [4]
- "Education-, motivation-, and gamification-related app features were considered important, with the highest ratings for motivation compared with gamification- and education-related app features" [4]
- "One particularly attractive feature of games like those developed by DeShazo *et al.* and Grimes *et al.* is that they enable individuals to use microbreaks—brief periods of free time during the day (e.g., while waiting for a bus or at the grocery store)—to increase their self-management knowledge while engaging in an entertaining, relaxing activity." [4]
- "Similarly, location and other contextual information, such as the user's calendar, could be used to alert individuals to opportunities for healthy activities and local resources relevant to their health situation (e.g., nearby restaurants that serve healthy food or a suggestion to take a walk after a long meeting)" [4]

## Feasibility Assessment

1. **Operational Feasibility:**
   Based on the information gathered above, user requirements, desired functionality and areas of concern may be addressed by ensuring the following:
   - A clean, streamlined user interface without many distracting UI elements
   - Reduced frequency of promotional advertisements and intrusive alerts
   - Sufficiently large customizability in terms of relevant fitness metrics (based on user need)
   - Continuous testing to refine UI/UX elements and regular updates which add new features
   - Contextual and user-aware GenAI suggestions to maximally support relevance and personalization

2. **Technical Feasibility:**
   System operation and upkeep can be managed using the resources below; data security, interchange and generative AI requirements are also considered:
   - Issues with data privacy which can be reso` lved by using:
     - ➢ Protocols like HTTPS(using TLS) to transfer data between the system and the server.

    - ➢ Collect only the necessary data and provide a transparent, easily understandable privacy policy to the users.
- Integration with existing wearable devices can be improved by developing APIs and integration tools to facilitate smooth data exchange.
- AI Can be used to provide personalized recommendations based on the user metrics , fitness goals and user preferences.
- Also AI can be used to combine data from multiple sensors of the wearable to enhance step counting accuracy.
- Ensure smooth and optimal transition between common operating systems such as IOS and Android.

3. **Economic Feasibility:**
   The main factors affecting investment, burn rate and runway estimation are as follows:
    - Investment needed to develop API to integrate with existing wearable brands like Apple, Google, Garmin etc.(Medium ROI) Focus on popular brands.
    - Machine learning algorithms to provide personalized recommendations are expensive but will result in better user satisfaction and engagement.(High ROI)
    - Improvised UI- Cost may vary based on the complexity of the Interface. (ROI is high)

4. **Schedule feasibility**:
   Estimated timelines for the development and release of the fitness coach app will be primarily affected by the following:
    - Keeping up with new upgrades with common operating software (IOS, Android)
    - Work with the marketing team to promote our new app
    - Roll out with a beta version of the app for consumers to test out within 6 months, and gain customer review.
    - Collect data and train AI models to produce user specific recommendations within a month.

## Expected Benefits

| Benefit | Type | Expected Timeline |
|---|---|---|
| Increased user fitness metric scores (see measures of success in next section) | Tangible | 6 months |
| Enhanced knowledge about fitness and nutrition | Tangible | 2 months |
| Increased tracking and more analytics about health and wellness measures | Tangible | 1 week |
| Better exercise and diet plan suggestions with increased user relevance | Tangible | 1 month |
| More positive user self-analysis | Intangible | 6+ months |

| | | |
|---|---|---|
| Lower stress and risk of future health conditions | Intangible | 1 year |
| More refined wellness regime/routines | Intangible | 3 months |
| Gaining user trust with solid and robust data privacy measures | Intangible | 8 months |

**How will success be measured**

a. 100+ active users within 90 days of app release
b. 85%+ retention rate of users (i.e. 85% of users use the app continuously for > 90 days) [1]
c. An average 10% reduction in body fat percentage within the first 6 months of starting a *Lean+* program
d. Being able to maintain an average rating of 4 stars or above on app stores and address 90% of critical issues within two weeks.
e. Users show a minimum of 10% increase in the fitness metrics like calories burned, Steps walked in a day in a time span of 3 months
f. To have an average response time of 0.5 seconds for all the app functionalities.
g. Compliance to data privacy rules, such as Apple [9] [JA].
h. An average 10% increase in lean muscle mass within the first 12 months of the program, across the *Lean+* and *Grow+* programs

**REFERENCES**

1. Aggarwal, Shanal. “Essential Guide: Measure What Matters - Key Metrics to Track Your Mobile App’s Success.” *TechAhead*, TechAhead Corp., 4 Mar. 2024, www.techaheadcorp.com/blog/essential-guide-measure-what-matters-key-metrics-to-track-your-mobile-apps-success/.
2. Helander E, Kaipainen K, Korhonen I, Wansink B. Factors related to sustained use of a free mobile app for dietary self-monitoring with photography and peer feedback: retrospective cohort study. J Med Internet Res. 2014 Apr 15;16(4):e109. doi: 10.2196/jmir.3084. PMID: 24735567; PMCID: PMC4004142. URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4004142/
3. Yang Y, Koenigstorfer J. Determinants of Fitness App Usage and Moderating Impacts of Education-, Motivation-, and Gamification-Related App Features on Physical Activity Intentions: Cross-sectional Survey Study. J Med Internet Res 2021;23(7):e26063. URL: https://www.jmir.org/2021/7/e26063 DOI: 10.2196/26063
4. Klasnja P, Pratt W. Healthcare in the pocket: mapping the space of mobile-phone health interventions. J Biomed Inform. 2012 Feb;45(1):184-98. doi: 10.1016/j.jbi.2011.08.017. Epub 2011 Sep 9. PMID: 21925288; PMCID: PMC3272165. URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3272165/
5. García-Fernández J, Gálvez-Ruiz P, Grimaldi-Puyana M, Angosto S, Fernández-Gavira J, Bohórquez MR. The Promotion of Physical Activity from Digital Services: Influence of E-Lifestyles on Intention to Use Fitness Apps. Int J Environ Res Public Health. 2020 Sep 18;17(18):6839. doi: 10.3390/ijerph17186839. PMID: 32962149; PMCID: PMC7559935. URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7559935/
6. Massive Health. [2013-11-04]. *webcite* The Eatery website https://eatery.massivehealth.com/
7. Valcarce-Torrente M, Javaloyes V, Gallardo L, García-Fernández J, Planas-Anzano A. Influence of Fitness Apps on Sports Habits, Satisfaction, and Intentions to Stay in Fitness Center Users: An Experimental Study. Int J Environ Res Public Health. 2021 Oct 2;18(19):10393. doi: 10.3390/ijerph181910393. PMID: 34639692; PMCID: PMC8507994. URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8507994/
8. “Legal - Health App & Privacy - Apple.” *Apple Legal*, www.apple.com/legal/privacy/data/en/health-app/.