Carnegie Mellon University

17-692 Product Management Essentials

Product Idea Workbook

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About the course.
In this course, students choose a familiar customer problem space for their course project. This space becomes the basis for developing their skills with applying fundamental, customer-centric product management concepts. Students identify the customers, define a worthwhile problem to solve, conceive and define a product solution, and design a value proposition that is compelling for customers to buy and use it.

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Product Narrative

In the evolving landscape of fitness technology, CycleAI emerges as a groundbreaking solution tailored to meet the unique needs of competitive cyclists globally, with a primary focus on training for cycling events. This innovative product narrative illuminates the journey of CycleAI, offering a detailed exploration of its market, the prevalent problem it addresses, and the transformative impact it brings to the cycling community.

Market Space:

CycleAI sets its sights on a vast market of 100 million competitive cyclists globally, strategically targeting men in their late twenties. This demographic is chosen for its potential financial stability, making them more likely to invest in sophisticated training tools.

Competition:

In a competitive landscape dominated by mobile apps and fitness trackers, CycleAI positions itself as a comprehensive solution. Unlike existing products, CycleAI doesn't require a smart trainer, offering a unique value proposition. Competitors like TrainerRoad and Zwift, while effective, lack the holistic approach that CycleAI brings, integrating advanced metrics, diet planning, and AI-powered training.

Market Entry Strategy:

CycleAI adopts a strategic approach to market entry, prioritizing the improvement of cyclists' speed in training. The initial focus is on men in their late twenties, a segment likely to invest more in sophisticated training tools. This niche positioning sets the stage for CycleAI to own a

distinct market segment, with a commitment to delivering the most comprehensive cycling trainer.

Total Addressable Market:

With 100 million potential users globally, CycleAI aims for widespread adoption. Priced at $250 for the fitness tracker and $22.99 per month or $239.99 per year for the app, CycleAI anticipates substantial revenue, projecting a total addressable market size of $49 billion in the first year and $24 billion annually thereafter.

Solution Space:

CycleAI, categorized as a mobile app with a fitness tracker, is designed to revolutionize the training experience for cyclists. The CycleAI app, named after the product itself, boasts advanced features, including AI-powered analysis, text and voice input options, and Bluetooth connectivity with a lightweight, customizable fitness tracker.

Customer Value Space:

The benefits of CycleAI extend beyond traditional fitness trackers. Advanced metric measurement provides cyclists with detailed insights, while the AI-powered app delivers personalized training plans. The product's pricing model ensures fairness, with a one-time payment of $250 for the fitness tracker and subscription-based fees for the app ($239.99/yr), enhancing the overall user experience.

Pricing Model:

CycleAI adopts a uniform pricing strategy, ensuring fairness and simplicity. The pricing metric includes a one-time payment for the fitness tracker and a recurring fee for the app. This approach aligns with customer expectations and reflects the value CycleAI delivers.

Customer Justification:

Customers investing in CycleAI will find a cost breakdown that includes the fitness tracker, app subscription, and potential ancillary costs like taxes and electricity. The "More for more" value proposition positions CycleAI as a superior choice, offering a comprehensive training and diet plan without the need for a smart trainer.

Strategy Space:

The strategic focus on speed improvement, market segment selection, and niche positioning sets CycleAI on a trajectory to dominate the cycling training market. The commitment to owning a distinct market segment through a pricing strategy emphasizing affordability and advanced features further strengthens CycleAI's strategic positioning.

In crafting this product narrative, CycleAI paints a vivid picture of its market entry, solution space, and strategic approach. The narrative encapsulates the essence of CycleAI, enticing executives with the potential for market dominance, inspiring product teams to connect with its purpose, and creating desire for marketing and sales efforts. As CycleAI propels into the market, it carries the promise of transforming the cycling training experience, embodying the spirit of innovation and comprehensive fitness solutions.

1. Customer Problem Space

Actor: Cyclist
Job To Be Done: Train for a cycling event

Use Cases:

1) Hilly route
2) Flat route
3) Event in cold climate
4) Event in hot climate
5) 400 km event
6) 600 km event

Outcomes:

1) Outcome idea: Increase speed.
    a) Actual outcome: Average speed is 18 km/hr on road-bike.
    b) Desired outcome: Average speed is 30 km/hr on road-bike.
    c) Measurement: Average km/hr on road bike.
2) Outcome idea: Reduce fat-to-muscle ratio.
    a) Actual outcome: Average FM is 21% in males and 28% in females.
    b) Desired outcome: Average FM is 7.5% in males and 10.5% in females.
    c) Measurement: Average FM ratio %
3) Outcome idea: Increase endurance of riding.
    a) Actual outcome: Endurance is 2 hours of saddle time.
    b) Desired outcome: Endurance is 32 hours of saddle time.
    c) Measurement: Hours of saddle time
4) Outcome idea: Increase cardio-respiratory endurance.
    a) Actual outcome: Average resting heart rate is 80 bpm.
    b) Desired outcome: Average resting heart rate is 50 bpm.
    c) Measurement: Average beats per minute (BPM)

Customer Journey Map: Attached as a separate document.

Problem: Average speed on road-bike is 12 km/hr less than desired speed.

Causes:

- Why: Less practice.
    - Why: Time constraints.
        - Why: Academic/professional commitments.
            - Why: Financial obligations.
                - Why: Need to sustain self and family.
    - Why: No professional training.
        - Why: Scarcity of trainers.
        - Why: Financial constraints.

- Why: Inadequate mental preparation.
    - Why: Less resilience.
        - Why: Less confidence.
            - Why: Unaccustomed activity.
                - Why: Less practice.
- Why: Inadequate physical preparation.
    - Why: Underdeveloped muscles.
        - Why: Inadequate muscle training.
            - Why: Inadequate practice.
                - Why: Amateur in sports.
        - Why: Not enough proteins and other nutrients in diet.
            - Why: Not much awareness.
                - Why: Novelty of subject.
                - Why: Casual approach.

- Why: Not enough consideration of aerodynamics.
    - Why: Not using a bike with optimal features.
        - Why: Bike doesn't have a carbon body.
            - Why: Financial constraints.
                - Why: Limited income.

Problem size: In 2022, the number of participants in road biking in the USA was 43.55 million. The population of the US is 4.23% of the world population. Scaling up the number of cyclists to the world, we get that the number of cyclists in the world is around 1 billion. Even if we consider very conservatively that only 10% of the cyclists in the world participate in competitive cycling events, we arrive at the number **100 million**. The bike sales in the world were 94889 in 2020 and 96432 in 2021, which was an annual increase of 1.6%. We can consider the rate of the number of cyclists increasing to be the same as that of bike sales increase. Hence, the growth rate of the number of cyclists is **1.6% per year.** The size gap is 12 km/hr average speed on road-bike per instance whenever a cyclist rides a bike.

Problem category: Competitive cycling training

Problem statement: We are looking at a competitive cycling training problem. When a cyclist starts training for a cycling event (e.g. a 600 km Brevet), they have an average cycling speed of 18 km/hr on a road bike, which is 12 km/hr less than top professional cyclists. One root cause of this problem is the lack of practice. We want to help the cyclists increase their average speed to 30 km/hr. There are approximately 100 million cyclists in the world that participate in competitive events. And there is expected to be a 1.6% per year growth in the number of cyclists.

2. Market Space

Market: 100 million competitive cyclists globally (Calculation in Problem Size section of the Customer Problem Space).

Market segments profile:

	Segment 1	**Segment 2**	**Segment 3**
Segment Name	Women in their early twenties	Men in their early twenties	Men in their late twenties
Variable 1: Gender	Female	Male	Male
Variable 2: Age group	20-24 years	20-24 years	25-29 years
Segment Size	518,000	7,254,000	7,068,000
Segment Growth	Slow increase	Slow increase	Slow increase

Segment size calculation: Average female participation is 7% (research paper in references). Hence female to male participant ratio is 7%:93% (i.e. 7 million:93 million). According to the World Bank data (in references), the percentage of females in 20-24 years age is 7.4%, males in 20-24 years age is 7.8%, and males in 25-29 years age is 7.6%. Hence, the segment size for segment 1 is 7 million * 7.4/100, for segment 2 is 93 million * 7.8/100, and for segment 3 is 93 million * 7.6/100.

Reasoning:

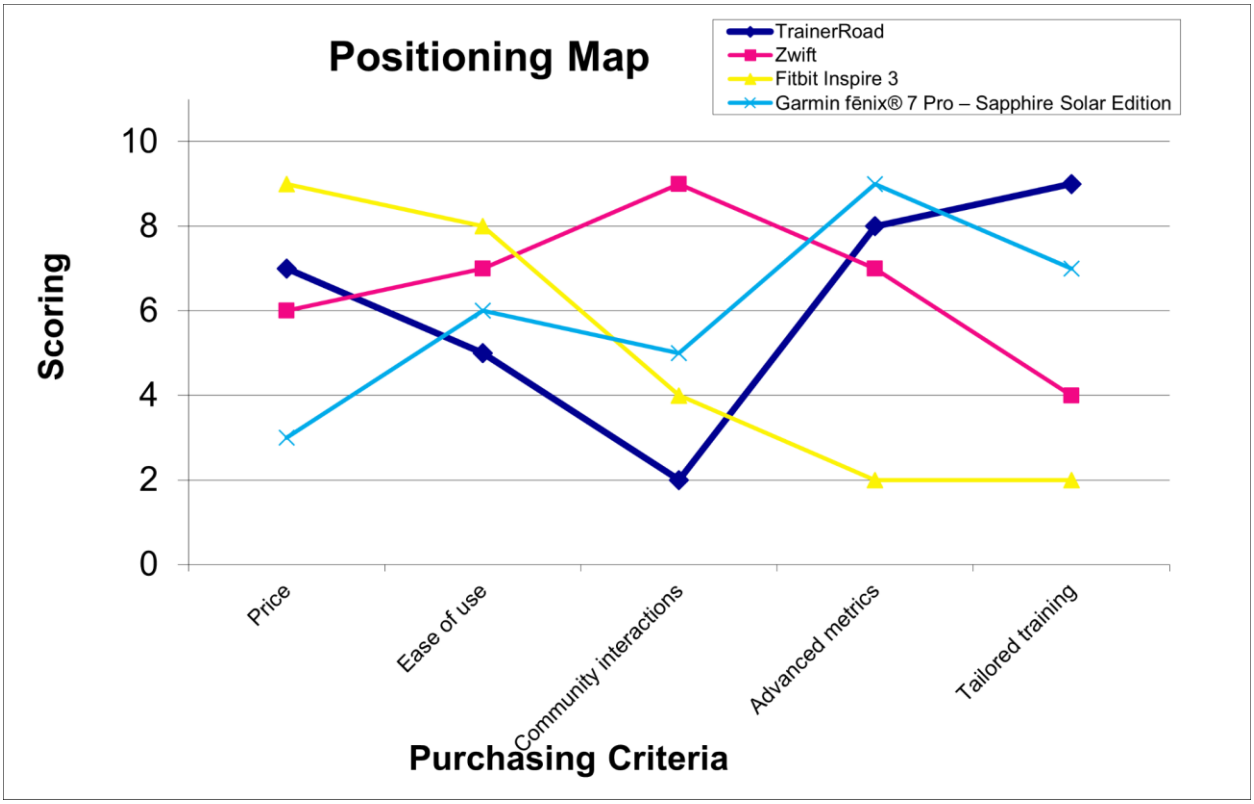
- Women in their early twenties: These females are at the age where they are just graduating/have graduated from college. They either have student debt or low paying starting salaries or both.
- Men in their early twenties: These males are at the age where they are just graduating/have graduated from college. They either have student debt or low paying starting salaries or both.
- Men in their late twenties: These males have passed the early stage of their career and may or may not have repaid their loans. They could also have additional responsibilities like getting married, having kids, buying a house, etc. which would result in them not having much money to spare.

Competition:

Product category	Products
Mobile app with Smart Trainer	1. Product 1.1 a. Brand name: TrainerRoad b. Company name: TrainerRoad c. Competitive positioning: It has scientifically designed structured plans and workouts tailored to individual needs. 2. Product 1.2 a. Brand name: Zwift b. Company name: Zwift c. Competitive positioning: It has a gamified virtual world where individuals can have social interactions. It also has a user-friendly interface.
Mobile app with Fitness tracker/Smartwatch	1. Product 2.1 a. Brand name: Fitbit Inspire 3 b. Company name: Fitbit c. Competitive positioning: It is user-friendly and has multiple basic features. It is also relatively cheap. It has a long battery life. 2. Product 2.2 a. Brand name: Garmin fēnix® 7 Pro – Sapphire Solar Edition b. Company name: Garmin c. Competitive positioning: It has a lot of metrics tracking and activity logging. It also has advanced features for cycling like, ClimbPRO ascent planner, etc.

Positioning:
Some criteria which the customers would use for choosing a product among the competitors, are:

- Price- The price of the product. Higher the score, lower the price.
- Ease of use- How easy is the product to navigate. Higher score means easier to use.
- Community interactions- Amount of social interactions you can have.
- Advanced metrics- Where and roughly how many advanced metrics are present.
- Tailored training- How much the training is tailored to the individual.



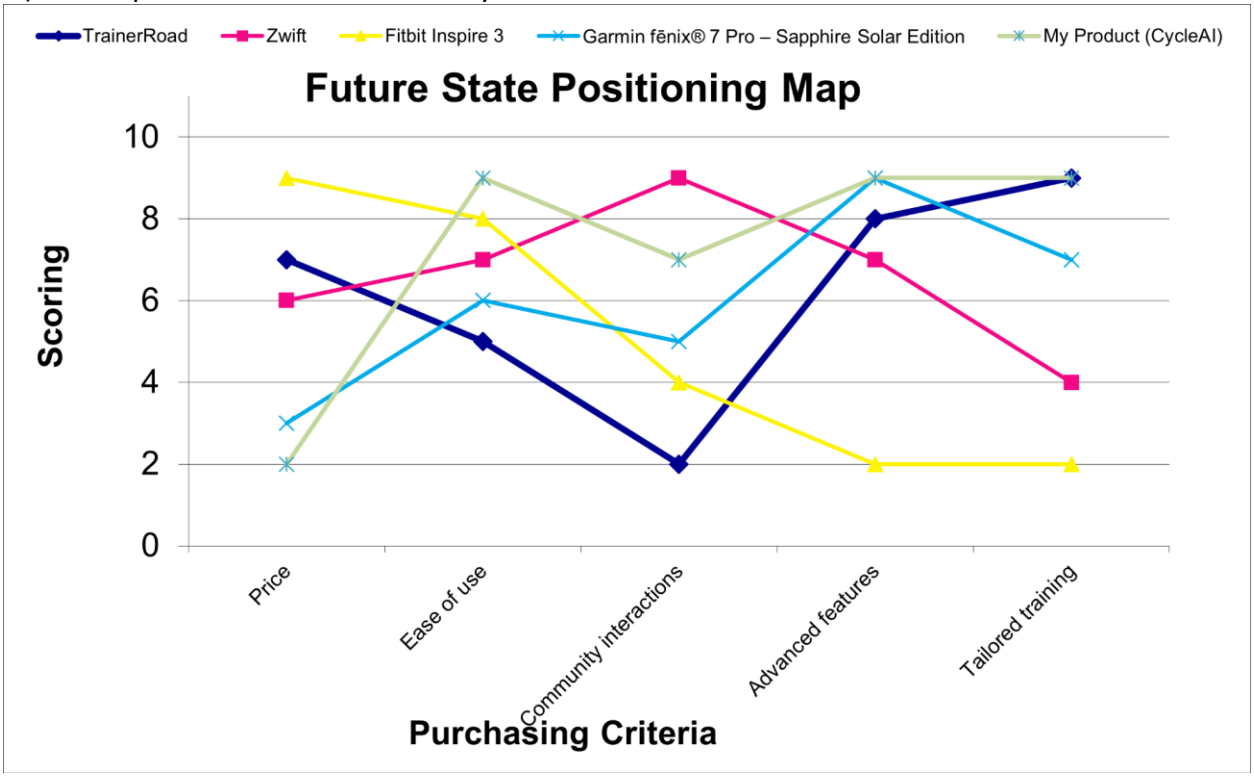
Market Entry:

i) Which problem will you solve first?
I will focus on helping the cyclists improve their speed as they train for the cycling event. The reason I'm choosing this problem is the other problems I identified will mostly automatically be addressed as a side effect of working on the speed.

ii) Which market segment will you serve first?
I will serve the market segment that I call Men in their late twenties. These are males in the age group 25-29 years. I chose this segment because this segment might be the most financially stable of the three segments and capable of spending a little more money.

iii) Which market niche will you serve first?
I will serve the group of male competitive cyclists in the age group 25-29 years who are at the advanced beginner or intermediate level of training. They will be more interested than complete beginners in sophisticated training tools. And advanced cyclists will have worked through these problem gaps and probably already have a set training regime.

iv) Which position in the market will you seek to own first?



My product will have the highest pricing (hence low score), highest ease of use, second highest community interactions, and the most advanced features with the best tailored training. I chose this position because my aim is to provide the most comprehensive cycling trainer with an affordable price. It will also be the easiest to use because the product will have a simple interface to type or voice record a question on top of a dashboard of metrics. But my product will also have a high development time and production cost.

Total Addressable Market

There are 100 million competitive cyclists globally. The price of getting the product and using the CycleAI app for one year is $250 + $239.99 (yearly subscription). If all competitive cyclists buy the product, in one year 100 million CycleAI fitness trackers will be sold and 100 million CycleAI apps will be downloaded. The revenue for the first year will be $49 billion and for the subsequent years will be $24 billion per year.

3. Solution Space

Product Focus

Product Category: Mobile app with fitness tracker

Product Description

Name: CycleAI

Purpose: Train cyclists for cycling events

Main Attributes:

- Fitness tracker with advanced metrics measurement
- AI-powered mobile app
- Text and voice input options
- Bluetooth connectivity

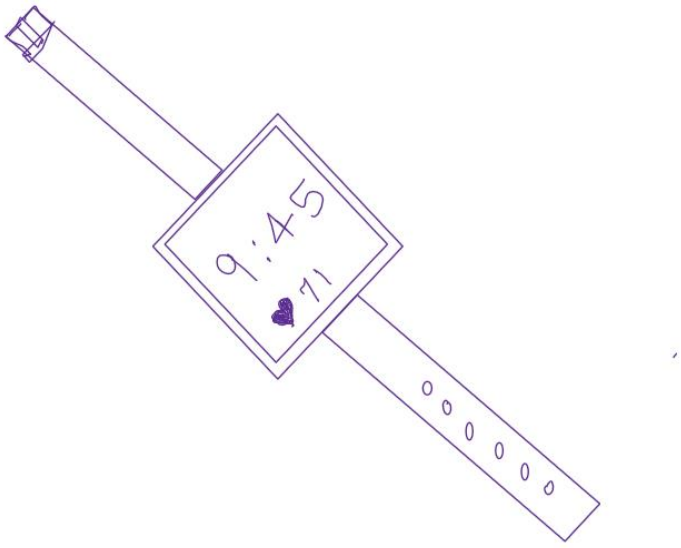
Properties: Light-weight tracker with touchscreen and silicone band in multiple colors.

Key technology: Speech input enabled pre-trained language model to process inputs and give instructions, Advanced sensors to track metrics more accurately, GPS tracking.

Operating requirements: Smartphone with iOS 17 or Android 14.

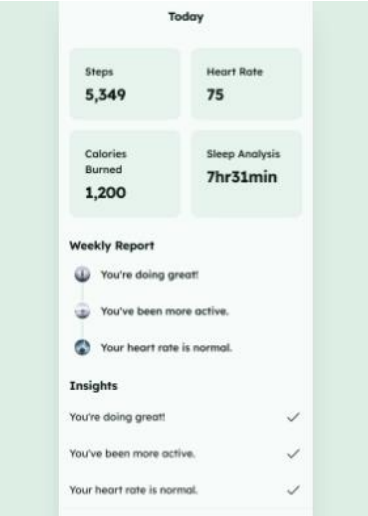
How it works:

1. The user installs the app and activates the tracker.
2. The user enters height, weight, age, and gender information.
3. The user goes on the most demanding ride possible for the app to access the current best performance.
4. The user views the current real-time metrics on the tracker.
5. The user verbally records whatever they are eating/drinking throughout the day and in what quantity.
6. The user asks the app what they should do next and how they should plan their training.
7. The user updates their weight at regular intervals.

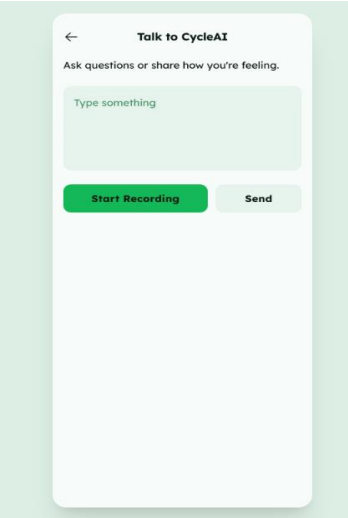


User view:

User view 1: Information-oriented (Dashboard shows health metrics)



User view 2: Task-oriented (Voice/text input page to ask questions or provide information to CycleAI. E.g.: The user records, “I just ate one 150g of Oikos triple zero yogurt.”)



Product requirements:

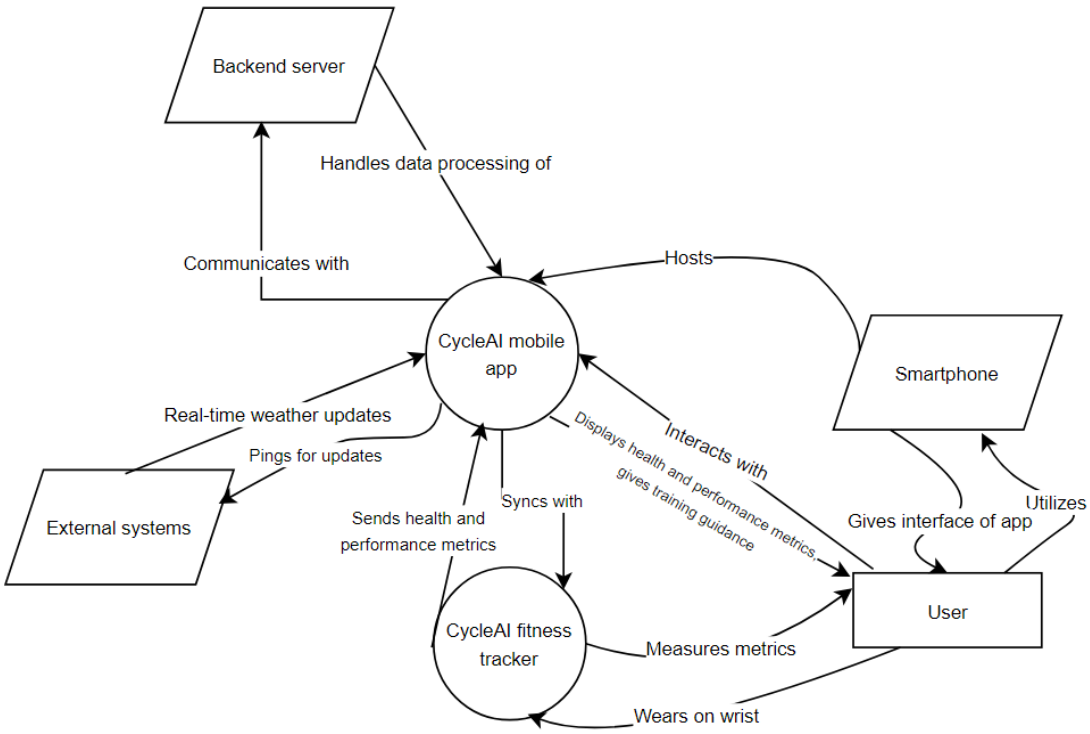
Type	ID	Requirement	Subgroup/Feat

			ure
Functional	F1.1	The app needs to have minimal instructions on each page.	Simple UI
Functional	F1.2	The app should direct the user in all the initial setup.	Simple UI
Functional	F1.3	The app always needs to have a “Talk to CycleAI” button at the bottom which will take the user to the page where the user can type or record any questions or information for CycleAI.	Simple UI
Functional	F1.4	The fitness tracker interface should enable quick viewing of the different current metrics by swiping on the touchscreen.	Simple UI
Functional	F2.1	The battery of the fitness tracker should last at least 12 days with GPS tracking enabled.	Performance
Functional	F2.2	The app should not slow down the working of the smartphone on which it is installed.	Performance
Functional	F3.1	The fitness tracker should measure the health metrics with 98% accuracy.	Accuracy
Functional	F3.2	The app should process the cycling performance information, the diet, the health metrics, and weather to give the most accurate instructions for further training towards the goal.	Accuracy
Functional	F4.1	As a cyclist training for an event, I want to spend the minimum amount of time inputting information to the app.	UX
Functional	F4.2	As a cyclist training for an event, I need to be motivated at times.	UX
Functional	F4.3	As a cyclist training for an event, I want the app to tell me when it is time to update my weight.	UX
Functional	F4.4	As a cyclist training for an event, I need the app to tell me how to structure my diet plan.	UX
Functional	F4.5	As a cyclist training for an event, I need the app to tell me specific menus for each meal based	UX

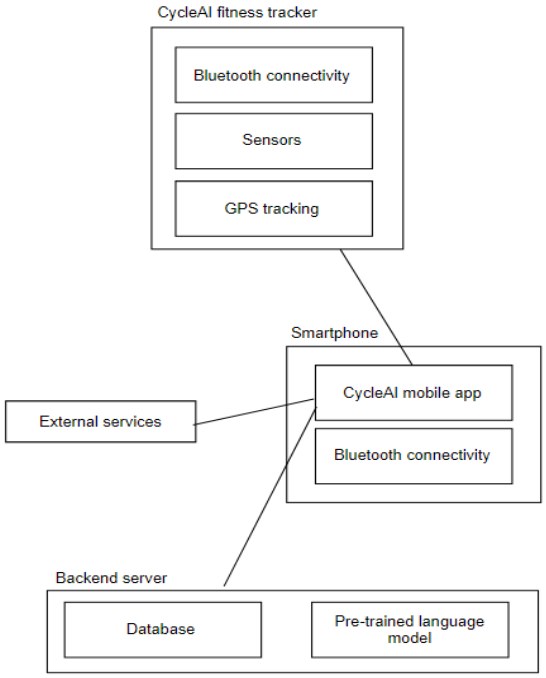
		on my requirements, what raw items I have available, and how much time I have.	
Functional	F4.6	As a cyclist training for an event, I need the app to tell me what training plan to follow that particular day.	UX
Non-functional	NF1.1	The app should have a responsive design and be easy to use for cyclists of all skill levels.	Usability
Non-functional	NF1.2	The user interface should be visually appealing and intuitive.	Usability
Non-functional	NF2.1	The app should load within 3 seconds on average on supported smartphones.	Performance
Non-functional	NF2.2	GPS tracking accuracy should have a deviation of less than 5 meters.	Performance
Non-functional	NF3.1	The app should have a system for regular backups to prevent data loss.	Reliability
Non-functional	NF3.2	The fitness tracker should provide consistent and reliable data during cycling activities.	Reliability
Non-functional	NF4.1	The app should handle an increasing number of users as the user base grows without a significant decrease in performance.	Scalability
Non-functional	NF5.1	User data, including personal information and performance metrics, should be encrypted during transmission and storage.	Security
Non-functional	NF5.2	The app should implement secure authentication methods to protect user accounts.	Security
Non-functional	NF6.1	The app should be compatible with a wide range of smartphone models and screen sizes.	Compatibility
Non-functional	NF6.2	The app should be optimized for both iOS 17 and Android 14.	Compatibility
Non-functional	NF7.1	The app code should be well-documented for easy maintenance and updates.	Maintainability

Non-functional	NF7.2	Updates to the app should be backward compatible with previous versions to ensure a smooth user experience during transitions.	Maintainability
Non-functional	NF8.1	The app should have an uptime of at least 99% to ensure users can access it whenever needed.	Availability
Non-functional	NF8.2	Any scheduled maintenance or downtime should be communicated to users in advance.	Availability
Non-functional	NF9.1	The app should be compatible with popular fitness platforms and devices, allowing users to integrate data seamlessly.	Interoperability
Non-functional	NF10.1	The app should comply with relevant privacy regulations and clearly communicate its data usage policies to users.	Privacy
Non-functional	NF10.2	User data should only be accessible to authorized personnel and processes.	Privacy

Context view:



Deployment view:



4. Customer Value Space

Benefits:

Feature	Benefits
Advanced metric measurement	Gain detailed insights into cycling performance metrics.
AI-powered mobile app	Receive personalized training plans based on AI analysis.
Text and Voice input options	Convenient input methods for users with diverse preferences.
Bluetooth connectivity	Seamless connection with the fitness tracker for real-time data.
Light-weight tracker	Comfortable to wear during cycling activities.
Touchscreen interface	Easily navigate through real-time metrics on the tracker.
Multiple color options	Customize the tracker's appearance to personal preferences.
Speech input language model	Effortlessly input information through natural language.
Advanced sensors	Ensure accurate tracking of health and performance metrics.
GPS tracking	Record precise cycling routes and distances.

Pricing model

Price setting Strategy: I choose the uniform price setting strategy because the CycleAI app is an AI based software that will help with the comprehensive training of a competitive cyclist. The fitness tracker of the CycleAI will also be the same for everyone because the product promises all the metrics will be measured and incorporated in the training and diet plan. There are no features that I would be offering more or less for me to use a non-uniform pricing strategy.

Pricing Metric: The users will be charged once per device for the fitness tracker and per account per month or per account per year (i.e. months or years used) for the app. The users will buy the fitness tracker at the beginning and use it with the monthly or yearly subscription of the app. It would not be very prudent to lease the device for a monthly fee, as enough cost would not be covered if the user used the product for a very short period of time.

Payment structure:

- Items that are charged: CycleAI fitness tracker, CycleAI mobile app
- Frequency of payment: Payment will be done once in the beginning for the fitness tracker ($250) and then every month ($22.99) or every year ($239.99) for the app.
- Timing of payment: The payment for the fitness tracker will be due at the time of buying the product, and the payment for the app will be due at the beginning of every month or beginning of every year, depending on the subscription type.
- Source of payment: The customer will pay for the product.

Price: I used reference pricing. From my research, customers are willing to pay $99.95 for a Fitbit Inspire 3 and $899.99 for a Garmin fēnix® 7 Pro – Sapphire Solar Edition fitness tracker. Based on that, I will charge $250 for the CycleAI fitness tracker as it will measure much more metrics than the Fitbit Inspire 3, but will not be showing the various features on the tracker itself, which the Garmin tracker does. The Zwift app costs $149.99 per year ($14.99 per month) and the TrainerRoad app charges $189 per year ($19.95 per month). Both of these apps can be used without smart trainers, but they only provide training plans for cycling. My product CycleAI will also guide the user in their diet planning. Hence, I will charge $22.99 per month or $239.99 per year.

Customer justification

Customer's cost items:

- Fitness tracker device: $250/device
- Fitness tracker charger: $0/charger
- App: $239.99 /year per account
- Taxes
- Repair cost
- Electricity
- Time setting up the app and device
- Time getting familiar with the product

The customer value proposition strategy of my product is "More for more" as compared to the competitor products because it will not require a smart trainer but will be able to provide a comprehensive training and diet plan customized for the user. The strength of differentiation is moderate because the Zwift and TrainerRoad apps can also be used when a smart trainer is not present. But, my product also provides diet and sleep instructions on top. There is almost no time-to-value and there is no risk involved with purchasing the product. Hence, the customers will be attracted to my product.

5. Strategy Space

Appendix

[items included here, as needed, with the details to complement or support the above work.]

References

FM ratio:
https://www.cdc.gov/nchs/nhanes/index.htm
https://www.bicycling.com/tour-de-france/a20031930/pro-cycling-and-body-fat/

Resting heart rate:
https://www.heart.org/en/healthy-living/fitness/fitness-basics/target-heart-rates
https://elitehrv.com/
https://www.healthline.com/health/athlete-heart-rate

Cardiorespiratory endurance:
Bard: "This information comes from my knowledge base, which is trained on a massive dataset of text and code. Unfortunately, I cannot share specific sources from this dataset."

Endurance:
Personal experience and time limit of Race-across-America qualifier Deccan Cliffhanger.

Problem size:
https://www.worldometers.info/world-population/us-population/
https://www.statista.com/statistics/763746/road-paved-surface-bicycling-participants-us/
https://www.raivereniging.nl/file/upload/doc/wbia-market-report-2021.pdf

Market segmentation:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7177769/
https://genderdata.worldbank.org/topics/population/