# Health Analytics Pro

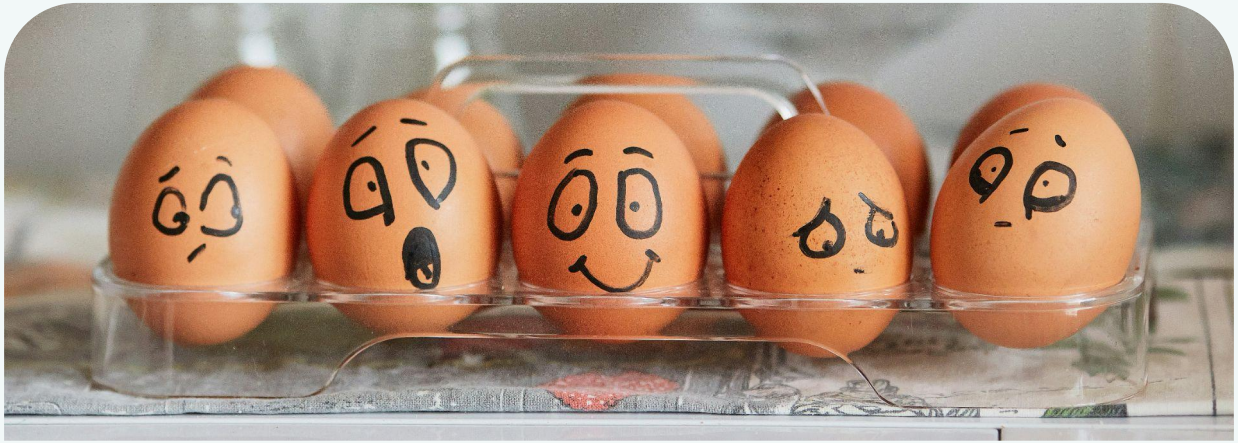
Personalized, Equitable, Transparent insurance plans

Nimesh Tripathi, Abdul Wahab, Ajeenaj Mcshan, Gaston Chi, Lovedeep Kaur

I got a discount !

I overpaid !

What's the emotion?



# Problem

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## Insurance Plan

Employer-sponsored **health insurance plans** are often **blanket "one-size-fits-all" plans**

## Insurance Provider

With “one-size-fits-all" plans, I**nsurers are subsidizing higher-risk individuals with lower premiums** and overcharging low risk individuals

**Few get discount & Few overpay!**

Health insurance plans/premiums are **unfair and NOT transparent**

# Mission

Revolutionize **healthcare insurance** by **offering personalized and equitable health coverage solutions** that caters to diverse needs of individuals, families, and employers,  with transparent and fair pricing for all stakeholders

# Vision

We envision **empowering individuals with personalized health plans** and **incentivizing healthy behaviors** to promote equitable, **proactive wellbeing**.

# Solution

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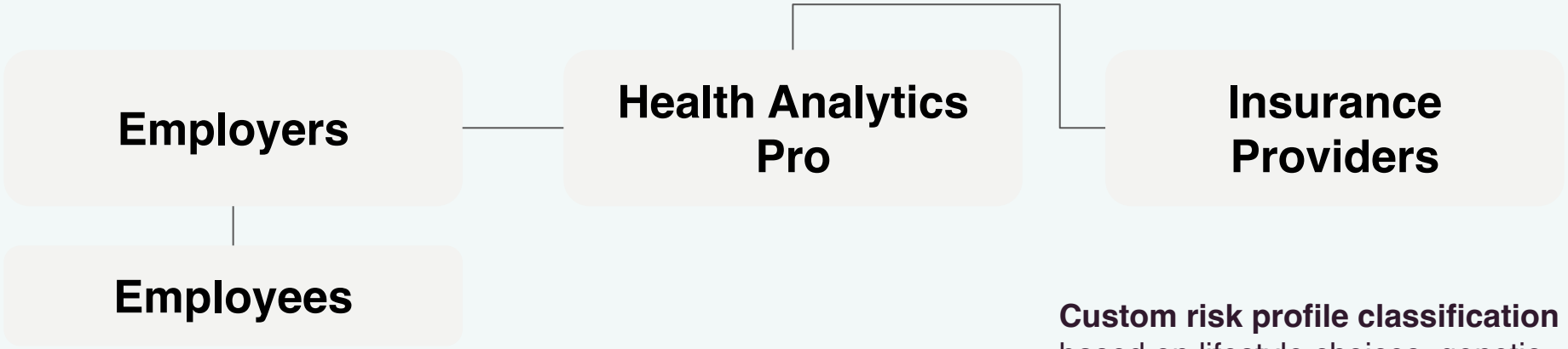
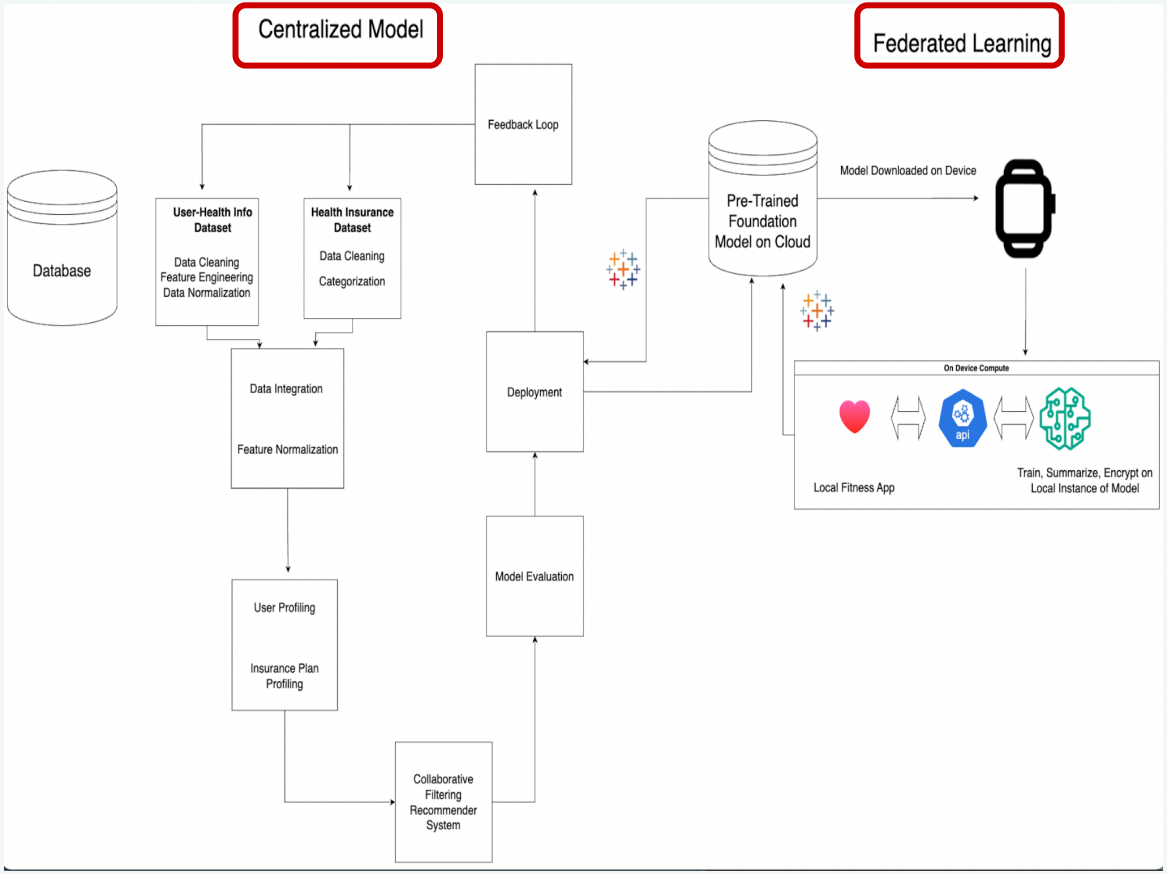
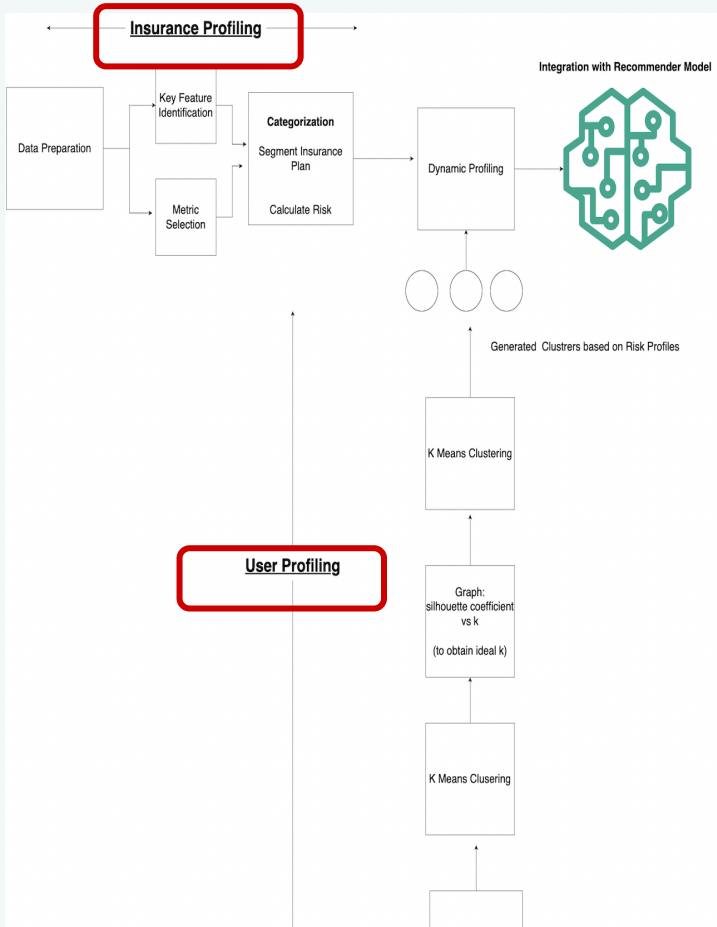
**A platform that connects employees to personalized health insurance plans/ provider and incentivize for proactive lifestyle**



# Solution - Classification and Recommendation



# Metrics

# Model Success Metrics

- Silhouette Coefficient
- Cohesion
- Separation
- Variance Ratio Criterion

- Diversity
- Novelty
- User Feedback loop

# Business Success Metrics

**Market Adoption & Growth for Insurance partners:**

Number of Insurance Partner Integrations:

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Market Share:

- 5-10 % of the medium sized companies within the first 2-3 years

Client based metrics:

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[1] Medium size is described as companies with 12 million or less members.

**Market Adoption & Growth for Startups**

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[1] There are estimated 2-3 million new business startups in US in a given year.
[2] Client (insured) satisfaction will be captured via a dashboard that we will created for the users.

# Business Success Metric (Incentives)

From tracking customers personal data, we can extract specific health risks (X) & suggest ways to improve their outcome (lifestyle). Suggesting solutions (A) will influence healthier behavior which will lead to reduction in quote rates/expensive doctor bills (Y).

- X (Health Risks)
  - Obese - weight
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- Y (Lifestyle change)
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  - Customer sleep patterns improves
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***Feedback Metric***

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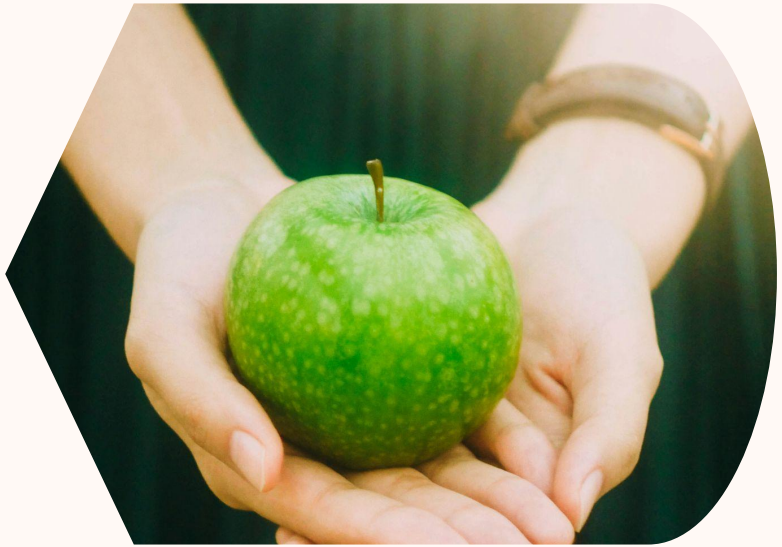
- Feedback will assist with identifying which audience will benefit most from our model.



# GTM

# Target Audience

1. **Small and Medium-sized Enterprises (SMEs)**

   Limited resources and may struggle to negotiate favorable rates with insurance providers. Employee needs are tailored and cost-effective solution.

1. **Startups and Fast-growing Companies: (Initial target segment)**

   This segment needs attractive health insurance benefits  and a seamless employee experience to attract and retain top talent with personalized coverage options

1. **Industry-specific Sectors:**

   Specialty industry have certain risk profile based on their workforce profiles, regulatory environments, and risk exposures

1. **Large and Multinational Corporations:**

   Have resources to negotiate good blanket pricing, however cannot provide personalization because of diverse profiles of employees and administration requirements

# GTM for Personalized Health Insurance

## Policy Holder

Differentiation Led go-to-market

- **Simplified UX** health plan **recommendations** (**rank by potential out-of-pocket savings with current plans)** based on customer profile and historical data

Growth Led go-to-market

- **Start-up and Growth companies are early adoptopters** for validating the MVP

## Insurer

Differentiation Led go-to-market

- Create **comprehensive risk profile with competitive pricing** for customer with personal lifestyle and health activity based model

Service Led go-to-market

- **Streamlined & personalized** policy issuance
- Fair and transparent policies

**Channels:** **Digital & social media Marketing**: Startups have strong social media presence
Partnerships with **Incubators and accelerators**

# Competition

# Competitive Analysis

Today no one is offering dynamic rate for insurance plans.

**Direct Competition**

The US health insurance market comprises of roughly  800 plus companies, with the top 10 capturing nearly 70% of the market share. These companies could potentially be our direct competitors as we gain traction.

**Few top players:**

•Unitedhealth Group
•Elevence Health (formerly known as Anthem BCBS)
•Centene Corp - Primarily Medicare and Medicaid

**Indirect Competition**

Few companies are offering personalized health insurance in other verticals such as home, auto, renters, pets & life. As we gain traction these companies could also be potential competitors. Listed below are few companies:

•Lemonade:  provides personalized insurance for renters, homeowners, pets, term life and cars.
•Policygenius: provides personalized home, auto and disability insurance.
•AllState:  provides personalized auto insurance.

**Current Player/s:**

Currently there are no major players in the personalized health insurance space other than Insureapp.

Insureapp seems to be the only company specifically offering personalized health insurance plans.

# Q & A

ASK - please help with user survey - Link

# GTM for Personalized Health Insurance

## Customer acquisition

**Differentiation Led**

- Flexibility and scalability with competitive pricing  for dynamic nature of startup
- Personalized benefits such as remote work, wellness programs and specialized benefits to retain top talent

**Channel**

- Digital & social media Marketing: Startups have strong social media presence
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## Customer Retention

**Service Led  go-to-market**

- Streamlined enrollment process & responsive customer support
- Enable value-added service such as mental health support, telemedicine as employees are open to try new offerings in health space

**long-term go-to-market**

- **Data Analytics : Personalized data**
- **Long Term partnerships**

# Health Analytics Pro

## Capstone Project

**Group # 10**
Nimesh Tripathi, Lovedeep Kaur, Abdul Wahab, Ajeenaj Mcshan, Gaston Chi

# Problem

**Policy Holder:**

Traditional **employer-sponsored health insurance** plans are often **blanket "one-size-fits-all" plans**, which does not adequately address the diverse health needs.

**Impact**: Employees with different health conditions, lifestyles, and family situations may have varying coverage requirements that are not fully met by a single plan.

**Insurer:**

With “one-size-fits-all" plans, I**nsurers are subsidizing higher-risk individuals with lower premiums** and overcharging low risk individuals.

**Impact:** Unfair and less transparent insurance policies.

# Mission and Vision

## Mission

Revolutionize **healthcare insurance** by **offering personalized and equitable health coverage solutions** that caters to individuals, families, and employers,  with transparent and fair pricing for all stakeholders

## Vision

- Empower individuals to take control of their health and well-being by offering **dynamic, personalized health insurance** plans that reflect their unique lifestyle choices.
- **Reward healthy behaviors** and encourage proactive health management through incentivized plans based on daily activity, workout frequency and intensity, heart rate, and other health data.
- Reduce **administrative costs** incurred by employers to provide insurance coverage to their employees.

# Summary

**Health Analytics Pro is a platform** that helps employees to select the **right insurance plan** via AI recommendation systems and enable custom risk profile classification for **Insurance providers to enable optimal insurance premium pricing** based personalized parameters such as lifestyle choices, genetic profile and environmental exposures.

We partner with employers as well as the mid-tier insurance providers, to incentivize healthier lifestyles, by offering discount to individuals with healthier lifestyles.

With personalized recommendation systems, we enable a simplified enrollment process that help reduce employer's administration costs by enabling flexible and incentivized insurance plans.

With personalized risk profile classification, We enable insurance providers to manage payouts and provide fair health premium price and plans, based on personalized risk profiles, to retain, and to subsequently offer better policies.

# Target Audience

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# Solution

**Step 1: Data Collection:**We also have public databases available which could be used as a training set, as there are millions of data points. These datasets consist of the traditional features, ingested for underwriting like: age, sex, weight, height, state, etc. To add lifestyle features like heartbeat, daily activity, high intensity/low intensity workouts, we will collect the data from the employees of our partner employer organizations, through wearables like Apple Watch, Pixel Watch etc. For training purposes, we can append additional columns, based on medical data available which mention the average heart rate in healthy vs unhealthy individuals, and the same method can be used for other columns

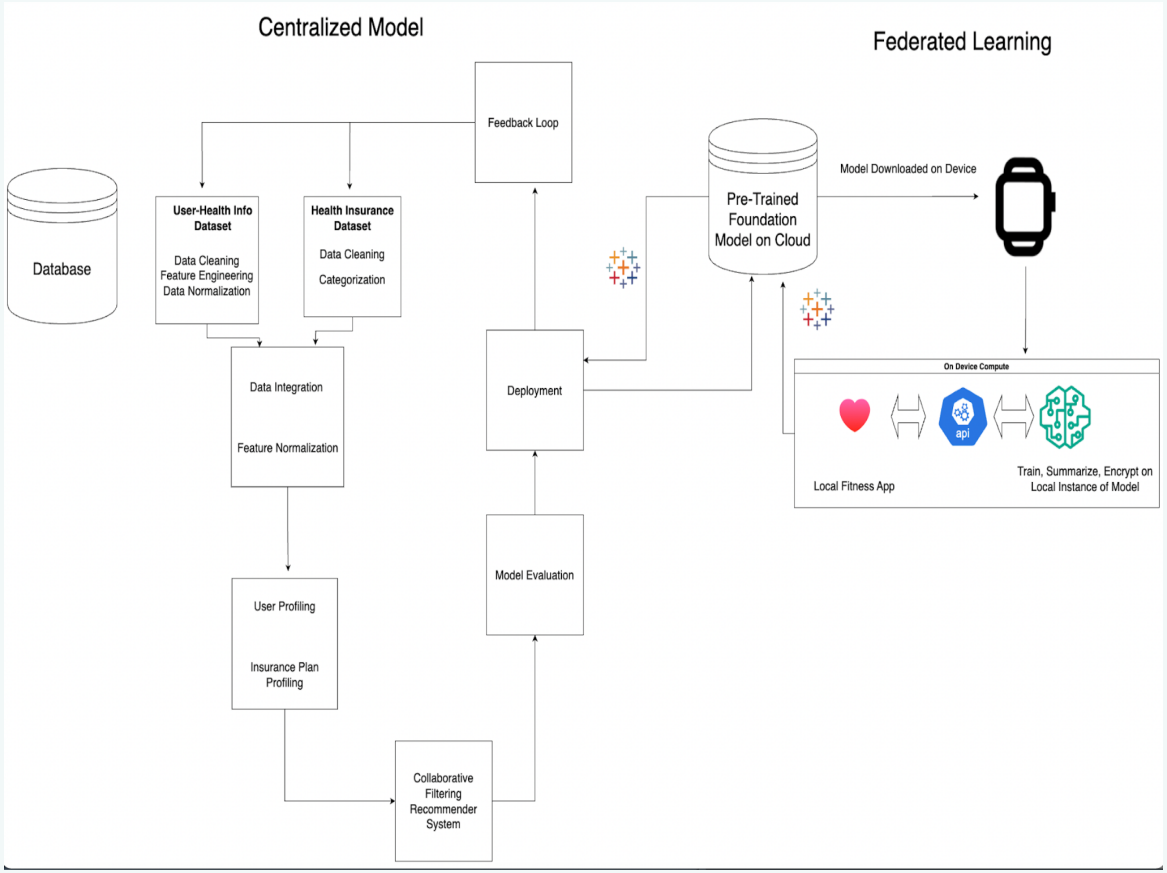
**Step 2a: User Profile:** To evaluate the risk profile, and organize them into clusters, we will cluster the data using K-Means clustering to get the first set of clusters. We will have to evaluate their efficiency using Silhouette score to understand their cohesion and dispersion with their own clusters as well as the neighboring clusters respectively. Based on different values of K we will plot a graph between the value of k and the silhouette scores. The highest silhouette score will be the ideal value of k, and we will re-evaluate the clusters based on the value of k.

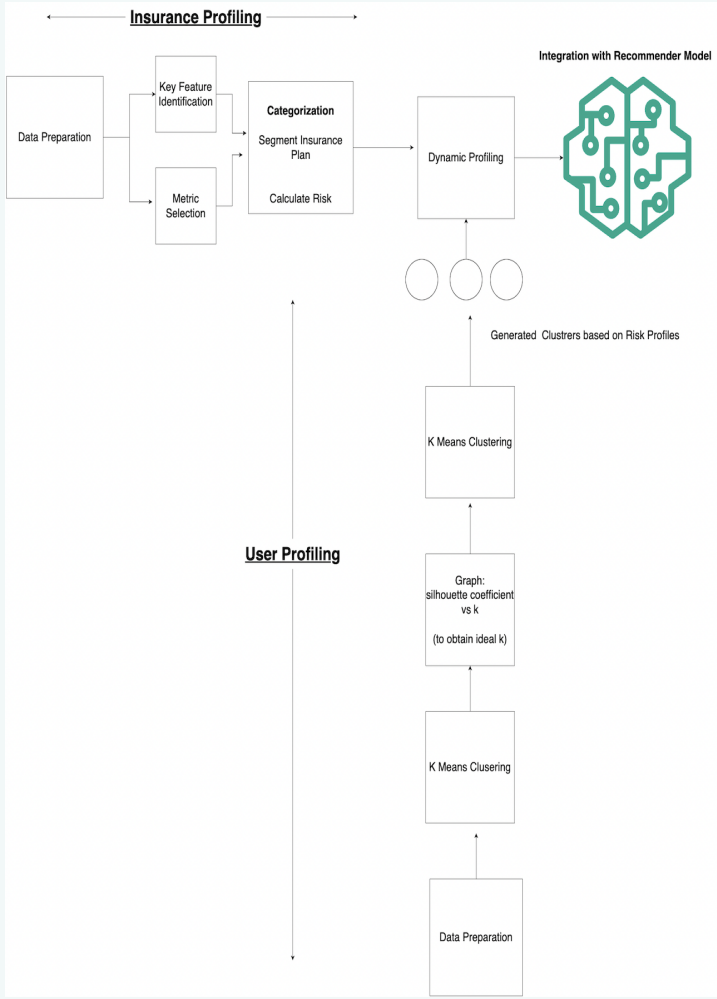
**Step 2b. Insurance Profile:** We collect the data and identify the key features like premium, copay etc. to profile the insurances, and we identify scoring metrics for each of those features. Then we segment the insurance plans into clusters, using clustering, and using the same silhouette score, we redo the clustering process using K means for a second time. Then we combine this with the risk profiles and feed it into our model.

**Step 3 Model:**User-Based Collaborative filtering starts by creating a matrix that contains the users and the insurance plans, after joining the 'User-Info Database' and the 'Insurance Plan Database'. Each cell in the matrix represents the correlation between users and insurance options that they chose.
**Step 4 Similarity:** Then we calculate the similarity between the users using Cosine Similarity or Euclidean Distance Similarity. This helps in recommending a particular employee, a tailor insurance option, which is similar to other similar users who have chosen a particular insurance plan, and have a similar profile. StesSS

**Step 5: Predictions and Implementation**
We tune or model to find the top K similar users, to the target users, based on their insurance choice.For the insurance recommendation, collaborative filtering recommends similar insurance options to people of similar groups, after identifying the latent relationships between competing features.
Example: 2 people whose average sleep time is 9 hours a day between the ages of 25-32, considering both are non-smokers will get similar recommendations.Our model will also incentivize healthier practises, by offering policies at a discounted rate as it will discriminate against the input column of user activity, sleep, and heartbeat.

# Model Architecture



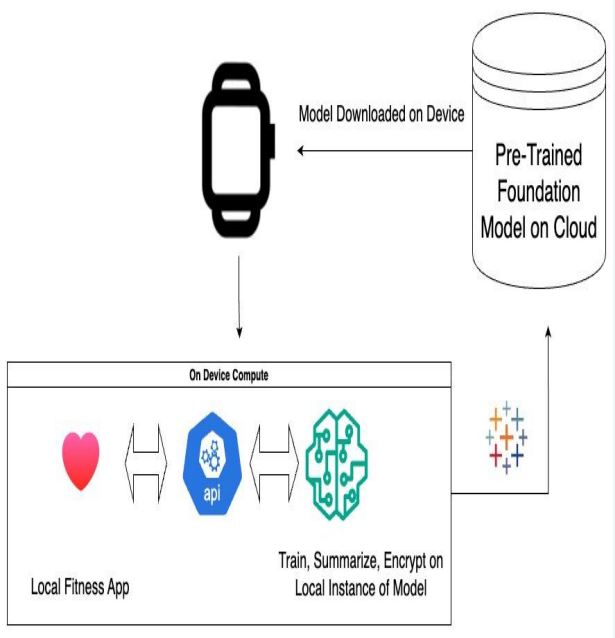
# System Integration and Considerations

**API Integration:**
Health, sleep and activity data on the user's device will be utilized through our API for data collection. This API will connect to Google FIt on Android wearables and Activity on Apple watches for collecting individual health data.

**Horizontal Federated Learning:**
Our Centrally trained model, which has been trained on similar datasets will be deployed on the user wearable devices, to reduce compliance risks and preserve anonymity of the data. The wearables will download the pre-trained model, and with the help of an API we will connect the fitness app to the model instance, to collect analytics data.The model will be trained on the user specific data, which will be summarized and encrypted and will be sent back to the central model.

**Important Considerations:**

1. Cold Start Problem (common in CF Systems): We are tackling the cold-start problem, that is common to the CF systems, as we have large enough datasets.
2. HIPAA Laws: We will have to ensure compliance with HIPAA laws, due to the regular sharing of private medical data. We deal with this, using Federated learning, which anonymizes the information, before it is sent to the Central Database. Only computations that are anonymized, leave the user device.
3. Compute Efficiency: CF systems involve heavy computations, but since our compute primarily happens on the Central Servers, and only certain calculations are performed on the user device, we can effectively implement this model.



# Model Success Metrics

1. **Silhouette Coefficient:** It basically helps us identify how similar an object is to its own cluster and how separate it is from different clusters. The users are modeled based on a similar risk profile and a high silhouette coefficient score suggests that the object is really close to the other users with a similar risk profile, in its own cluster. Similar profiles have high silhouette score (close to 1) It varies between -1 and 1 where:

   1 :Highly fitting to its own cluster and different from neighboring clusters

   0 :Some overlap between neighboring clusters.

   -1: Misclassified

   **silhouette coefficient =** (separation - cohesion) / max(separation, cohesion)

   **Cohesion:** Average(distance between our reference point and the points within its own cluster)

   **Separation:** Average (distance between our reference point and the points in the nearest neighboring cluster)

1. **Variance Ratio Criterion:** This metric is the ratio of the sum of between-clusters dispersion and of within-cluster dispersion for all clusters. Higher scores are better and indicate that the clusters are dense and well separated, which is desirable in our project.
2. **Diversity**: In the context of insurance recommendations, diversity refers to a variety of insurance plans recommended across users. This can be important to ensure that our model is not biased towards certain plans.
3. **Novelty**: Sometimes, it's beneficial to recommend insurance options that are not very popular or known to users, if it aligns well to their risk profiles. Novelty can be an interesting metric to track to ensure that our model is not just recommending the most common plans
4. **User Feedback:** Collecting user feedback can act as another layer to our feedback loop to our model, and it can be valuable during retraining.

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# Impact

- **Potential for lower premiums:** By actively engaging in healthy behaviors, policyholders could earn rewards or discounts, leading to reduced costs.
- **Personalized coverage:** Plans tailored to individual lifestyles might provide more relevant benefits and avoid unnecessary coverage.
- **Improved health outcomes:** Encouraging healthy habits may lead to lower risks of chronic diseases and healthcare costs in the long run.
- **Greater engagement and ownership:** Active participation in managing their health plan might increase policyholder satisfaction and engagement.
- **Iterative Improvement:** Insight gathered from performance metrics and feedback from clients will be used to make iterative improvement to the product. Constant refinement based on data driven insight will further enhance the products impact over time.
- **Customer Feedback and Satisfaction:** Customers satisfaction will be gathered through reviews, surveys and direct interaction to understand their satisfaction with the product. High satisfaction and positive feedback will indicate a positive impact on our client.

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- Establish **feedback loop** to improve the **model recommendation and UX improvement**

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