# ACES Machine Learning Model

## Introduction:

ACES plans to use machine learning (ML) to control the approval of claims. This will involve the development of a predictive model that can assess the eligibility of claims and make approval or denial decisions based on historical data and relevant features

Here is a summary of the processes required to implement ML for claim approval:

**Data Collection:**

- Gather historical data on claims, including approved and denied claims.
- Collect information on policyholders, healthcare providers, claim amounts, claim types, medical diagnoses, and any other relevant features.

**Data Preprocessing:**

- Clean and preprocess the data to handle missing values, outliers, and data inconsistencies.
- Encode categorical variables and normalize numerical variables.
- Split the data into training, validation, and test sets.

**Feature Engineering:**

- Identify and create relevant features that can help the model make informed decisions. This may include features related to the policyholder's medical history, age, gestational age, and more.

**Model Selection:**

- Choose an appropriate machine learning model for the task. Common choices include logistic regression, decision trees, random forests, or more advanced models like gradient boosting or neural networks.

**Model Training & Hyperparameter Tuning:**

- Train the selected ML model using the training data.
- Utilize labeled historical data, where claims are marked as approved or denied, to teach the model patterns and relationships in the data.

- Optimize the model's hyperparameters using techniques such as grid search or random search to improve its performance.

**Testing:**

- Assess the model's performance on a separate test set to ensure it generalizes well to new, unseen data.

**Deployment:**

- Deploy the trained ML model into the insurance claims processing system so that it automatically evaluates incoming claims.

**Monitoring and Maintenance:**

- Continuously monitor the model's performance in a production environment.
- Update the model as needed to adapt to changing patterns in claims or policyholder behavior.

## Piolet Project Overview:

ACES is designed to speed up claim processing, improve accuracy in claim approvals, optimize resource allocation, and improve the quality of decisions as a whole. Therefore, we will develop a pilot project to control maternity claims in our claims management system using machine learning (ML).

This forward-looking initiative aims to optimize the approval and assessment of **maternity claims**, specifically focusing on two critical aspects: the approval of the ***length of stay*** and the determination of ***claim amounts***.

Here are some key features to consider for maternity claim assessment ML model:

1. Healthcare Provider Name
2. Type of Healthcare Provider Facility
3. Location of Healthcare Provider
4. Physician Name
5. Age of the Pregnant Member
6. Admission Date (Month & Year Saved Separately)
7. Admission Class

8. Admission Through ER
9. General Assessment Code
10. ICDs Codes
11. Discharge ICDs Codes
12. Length of Stay
13. Estimation Amount
14. Claim Approved amount

**Additional Features**

15. Medical justification for the length of stay*
16. Lifestyle factors that may impact maternity outcomes (e.g., smoking, alcohol consumption, exercise) *
17. Any pre-existing medical conditions of the pregnant individual: chronic conditions, preterm births, medications, etc…
18. Number of pregnancies