# Analysis

**Background**

Bellabeat has been a high-tech manufacturer of beautifully-designed health-focused smart products for women since 2013. Inspiring and empowering women with knowledge about their own health and habits, Bellabeat has grown rapidly and quickly positioned itself as a tech-driven wellness company for females.

The co-founder and Chief Creative Officer, Urška Sršen is confident that an analysis of non-Bellabeat consumer data (ie. FitBit fitness tracker usage data) would reveal more opportunities for growth.

**Business Task:**

Analyse FitBit Fitness Tracker Data to gain insights into how consumers are using the FitBit app and discover trends and insights for Bellabeat marketing strategy.

**Business Objectives:**

1. What are the trends identified?
2. How could these trends apply to Bellabeat customers?
3. How could these trends help influence Bellabeat marketing strategy?

**Deliverables:**

1. A clear summary of the business task
2. A description of all data sources used
3. Documentation of any cleaning or manipulation of data
4. A summary of analysis
5. Supporting visualizations and key findings
6. High-level content recommendations based on the analysis

**Key Stakeholders:**

1. Urška Sršen: Bellabeat's cofounder and Chief Creative Officer
2. Sando Mur: Mathematician, Bellabeat's cofounder and key member of the Bellabeat executive team
3. Bellabeat marketing analytics team: A team of data analysts guiding Bellabeat's marketing strategy.

**Information on Data Source:**

1. The data is publicly available on [Kaggle: FitBit Fitness Tracker Data](#) and stored in 18 csv files.
2. Generated by respondents from a distributed survey via Amazon Mechanical Turk between 12 March 2016 to 12 May 2016.
3. 30 FitBit users who consented to the submission of personal tracker data.
4. Data collected includes (1) physical activity recorded in minutes, (2) heart rate, (3) sleep monitoring, (4) daily activity and (5) steps.

**Limitations of Data Set:**

1. Data collected from 2016. Users' daily activity, fitness and sleeping habits, diet and food consumption may have changed since then, hence data may not be timely or relevant.
2. Sample size of 30 female FitBit users is not representative of the entire female population.
3. As data is collected in a survey, hence unable to ascertain the integrity or accuracy of data.

**Data Selection:**

The following file is selected and copied for analysis : dailyActivity_merged.csv


STEP 3: PROCESS

We are using Python to prepare and process the data.

**Preparing the Environment**

The numPy, pandas, matplotlib, datetime packages are installed and aliased for easy reading.

Cleaning the data by removing null values , duplicates and outliers

Perform calculations

Understanding the statistics of df_activity for analysis.

Interpreting statistical findings:

1. On average, users logged 7,637 steps or 5.4km which is not adequate. As recommended by CDC, an adult female has to aim at least 10,000 steps or 8km per day to benefit from general health, weight loss and fitness improvement. Source: Medical News Today article

2. Sedentary users are the majority logging on average 991 minutes or 20 hours making up 81% of total average minutes.

3. Noting that average calories burned is 2,303 calories equivalent to 0.6 pound. Could not interpret into detail as calories burned depend on several factors such as the age, weight, daily tasks, exercise, hormones and daily calorie intake. Source: Health Line article

Creating visualisations and communicating our findings based on our analysis.

Notable Insights

- Frequency of usage across the week

  - In this histogram, we are looking at the frequency of FitBit app usage in terms of days of the week.

  - We discovered that users prefer or remember (giving them the benefit that they forgot) to track their activity on the app during midweek from Tuesday to Friday.

  - Noting that the frequency dropped on Friday and continued on weekends and Monday.

- Calories burned for every step taken

  - From the scatter plot, we discovered that:

  - It is a positive correlation.

  - We observed that intensity of calories burned increase when users are at the range of > 0 to 15,000 steps with calories burn rate cooling down from 15,000 steps onwards.

- ○ Noted a few outliers:

    - ■ Zero steps with zero to minimal calories burned.

    - ■ 1 observation of > 35,000 steps with < 3,000 calories burned.

    - ■ Deduced that outliers could be due to natural variation of data, change in user's usage or errors in data collection (ie. miscalculations, data contamination or human error).

## STEP 6: ACT

In the final step, we will be delivering business recommendations

**1. What are the trends identified?**

- The FitBit app is used by the majority of users (81.3%) to track sedentary behaviours rather than health practises.
- Users prefer to track their activities throughout the week as opposed to the weekends, maybe because they spend more time outside during the week and stay indoors on weekends.

**2. How could these trends apply to Bellabeat customers?**

- Both firms create products aimed at giving women information on their health, habits, and fitness, as well as encouraging them to understand their present patterns and make good choices. These prevalent health and fitness trends can very well be applied to Bellabeat clients.

**3. How could these trends help influence Bellabeat marketing strategy?**

- The Bellabeat marketing team can encourage users by educating and equipping them with knowledge about fitness benefits, recommending different types of exercise (for example, a simple 10 minute exercise during the week and a more intense exercise on weekends), and providing calories intake and burn rate information on the Bellabeat app.
- On weekends, the Bellabeat app may send messages to users to urge them to exercise.