



Worksheet 4: From Real Data to a Mobile App

So far, you have read data, visualized it, and calculated statistics. Today, you go one step further, you will explore how a real mobile app can be built using 10 years of air quality data from Karposh, Skopje, and think about how you could build one yourself.

The app was built using:

- OpenAQ: a free platform with real-time and historical air quality data from 100+ countries.
- MIT App Inventor: a free tool for making Mobile applications.
- Google Sheets: as a bridge to bring the data into the app.

Part A – Explore the Real Data Source

Open your browser and go to: <https://explore.openaq.org/locations/2977>

This is the Karposh monitoring station in Skopje. It has been collecting data since 2016.

1. What sensors does the Karposh station have? List all the parameters you can see:

2. OpenAQ shows charts only for recent data. If you wanted to analyse 10 years of data, what problem would you face?

3. Why do you think it matters to use an open data source like OpenAQ rather than just searching for numbers on a random website?



Worksheet 4: From Real Data to a Mobile App

Part B — Understand the Data Pipeline

Someone already downloaded and processed the 10 years of data for you. Here is how they did it: read the steps carefully and answer the questions below:

- **Step 1** → Downloaded raw daily data from OpenAQ using an API
- **Step 2** → Processed the data: split by parameter, calculated monthly averages, added WHO limit lines (PM10 = 45 $\mu\text{g}/\text{m}^3$, PM2.5 = 15 $\mu\text{g}/\text{m}^3$)
- **Step 3** → Saved the clean data as an Excel file
- **Step 4** → Uploaded the Excel file to Google Sheets
- **Step 5** → Connected Google Sheets to MIT App Inventor
- **Step 6** → Built an app that displays PM10 and PM2.5 trend charts

1. Why do you think daily data was converted into monthly averages before putting it into the app? What problem does this solve?

2. A WHO limit line was added to the chart at PM10 = 45 $\mu\text{g}/\text{m}^3$ and PM2.5 = 15 $\mu\text{g}/\text{m}^3$. Why is having this line on the chart more powerful than just showing the data alone?

3. Google Sheets sits in the middle between the Excel file and the app. Can you think of why this step is needed — why not connect the Excel file directly to MIT App Inventor?



Worksheet 4: From Real Data to a Mobile App

Part C – Explore the App Structure

The model app has three screens:

Screen	What it does
Home	Let the user choose between PM10 and PM2.5
PM10 screen	Shows a monthly trend chart with a limit line
PM2.5 screen	Same layout, different data

Now answer.

1. The Home screen has two buttons – one for PM10 and one for PM2.5. In the Block editor, what do you think happens when a user taps one of those buttons?

2. The app uses a component called "Spreadsheet" to load the data from Google Sheets. Why is this better than typing the data directly into the app?

3. Look at the block logic for the PM2.5 screen. The limit line is drawn as a constant horizontal line across the whole chart. In your own words, describe how you would explain this to someone who has never used MIT App Inventor:



Worksheet 4: From Real Data to a Mobile App

Part D — Read the Chart, Tell the Story

The app shows 10 years of monthly PM10 and PM2.5 data from Karposh. Based on what you know from the workshop, answer these questions:

1. The data shows a clear seasonal pattern — pollution is **HIGH** in winter and **LOW** in summer. What are two likely reasons for this pattern in Skopje specifically?

- _____
- _____

2. The WHO limit line sits at $\text{PM}_{10} = 45 \mu\text{g}/\text{m}^3$. If a winter month in Karposh reaches $120 \mu\text{g}/\text{m}^3$, how many times above the limit is that?

_____ times above the WHO limit

3. Imagine you are a parent of a young child living in Karposh. You open this app in January. What decision might you make based on what you see — and what would you want the app to tell you that it currently does not?



Worksheet 4: From Real Data to a Mobile App

Part E – Design Your Own App Idea

The same pipeline can be used for **any location** in the world that has an OpenAQ station.

1. Go to explore.openaq.org and find one other location that interests you. Write its name and location ID:

Location name: _____ Location ID: _____

2. If you built an app for that location, what would your app show beyond just a chart? List two features you would add to make it more useful for real people:

- _____
- _____

3. Who would be the main users of your app – who would benefit most from having this information on their phone?
