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# 1. Key Elements of a Dashboard

A dashboard is a type of graphical user interface that provides an at-a-glance view of key performance indicators (KPIs) relevant to a particular objective or business process. The key elements are:

- **Visuals (Charts and Graphs):** These are the core of the dashboard. They present data in an easy-to-understand graphical format. Common visuals include bar charts, line charts, pie charts, and maps. The choice of visual should be appropriate for the data being presented.
  - **Key Performance Indicators (KPIs):** These are specific, quantifiable metrics that track performance against a business objective. They are often displayed prominently as large numbers or gauges so they can be seen and understood quickly.
  - **Interactivity:** Modern dashboards are rarely static. Interactivity allows users to explore the data. This includes:
    - **Filters and Slicers:** Tools that allow users to narrow down the data to a specific time period, category, or region.
    - **Drill-down/Drill-through:** The ability to click on a data point to see more detailed, underlying data.
  - **Clear and Logical Layout:** The arrangement of visuals should be intuitive. The most important information (like KPIs) is typically placed at the top-left, as that's where a user's eye naturally goes first. The layout should guide the user through a story or a logical analysis of the data.
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## 2. What is a KPI?

A **KPI**, or **Key Performance Indicator**, is a measurable value that demonstrates how effectively a company or individual is achieving key business objectives. Organizations use KPIs to evaluate their success at reaching targets.

In the context of your Road Accident Analysis project, some examples of KPIs would be:

- **Total Number of Accidents:** A simple count of all incidents.
- **Total Casualties:** The sum of all injuries and fatalities.
- **Fatality Rate:** The percentage of accidents that result in a fatality.
- **Year-over-Year Change in Accidents:** The percentage increase or decrease in

accidents compared to the previous year.

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### 3. What are Slicers in Power BI?

**Slicers** in Power BI are a type of on-canvas visual filter. They provide a simple and intuitive way for end-users to filter the data displayed in the other visuals on a report page.

Instead of using a hidden filter pane, slicers are visible on the report itself as buttons, lists, dropdowns, or sliders. For example, in your road accident report, you could have slicers for:

- **Year:** Buttons for each year (e.g., 2021, 2022, 2023).
- **Severity:** A list to choose between "Fatal," "Serious," and "Slight."
- **Day of Week:** A dropdown to select one or more days.

When a user clicks an option in a slicer, all related visuals on the page are instantly filtered to show data only for that selection.

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### 4. Difference between Power BI and Tableau

Power BI and Tableau are two of the leading business intelligence and data visualization tools. While they have similar goals, they differ in several key areas.

Feature	Power BI	Tableau
<b>Ease of Use</b>	Generally considered easier to learn, especially for users familiar with Microsoft Excel.	Has a steeper learning curve but offers a high degree of flexibility and customization.
<b>Data Connectivity</b>	Excellent integration with the Microsoft ecosystem (Azure, SQL Server, Excel). Connects to many sources.	Also connects to a vast number of data sources, often praised for its performance with large datasets.

<b>Cost</b>	More affordable. Power BI Desktop is free, and the Pro licensing is typically cheaper per user.	Generally more expensive, especially for large enterprise deployments.
<b>Data Modeling</b>	Uses DAX (Data Analysis Expressions), a powerful formula language similar to Excel functions.	Uses MDX (Multidimensional Expressions) for creating calculations, which can be more complex than DAX.
<b>Primary Audience</b>	Often favored by business analysts and general business users.	Traditionally favored by data analysts and data scientists who require deep data exploration.

## 5. How to make a dashboard interactive

Interactivity is crucial for a good dashboard as it allows users to explore data and discover insights on their own. You can make a dashboard interactive by:

- **Using Slicers and Filters:** As mentioned above, these are the most direct way to let users narrow the scope of the data.
- **Enabling Cross-Filtering and Cross-Highlighting:** This is a default behavior in Power BI. When you click on a data point in one visual (e.g., a bar in a bar chart), it automatically filters or highlights the corresponding data in all other visuals on the page.
- **Setting up Drill-Downs:** This allows users to explore data hierarchically. For example, a user could view total accidents by year, then click on a year to "drill down" and see the data broken down by month, and then further down to the day.
- **Creating Drill-through Pages:** You can create a dedicated report page with detailed information about a specific category. Users can then right-click a data point in a summary chart and "drill through" to this detailed page, which will be pre-filtered for the selected data point.
- **Using Bookmarks:** Bookmarks allow you to save specific states of a report page (i.e., with certain filters and visuals selected) and create buttons or links that let users quickly navigate between these saved views.
- **Customizing Tooltips:** You can create custom tooltips that appear when a user hovers over a visual, showing additional charts or data points relevant to what they are hovering

over.

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## 6. How to deal with large datasets in dashboards

Working with large datasets (millions or billions of rows) in Power BI requires optimization to ensure the dashboard remains fast and responsive. Key strategies include:

- **Choose the Right Storage Mode:**
    - **Import Mode:** This is the default and fastest mode for analysis, as it loads all the data into Power BI's memory. However, it can be slow to refresh and is limited by your computer's RAM.
    - **DirectQuery Mode:** This mode does not import data. Instead, it sends queries directly to the source database every time a user interacts with the dashboard. It's ideal for very large datasets or when you need real-time data, but it can be slower depending on the source database's performance.
  - **Optimize the Data Model:** A well-structured data model is crucial. The best practice is to use a **star schema**, where you have a central "fact table" (e.g., your accidents table) connected to multiple "dimension tables" (e.g., tables for date, vehicle type, location).
  - **Reduce Data Size:**
    - **Remove Unnecessary Columns and Rows:** In Power Query, remove any columns you don't need for your visuals. Also, filter out any rows that are irrelevant to the analysis.
    - **Aggregate Data:** If you don't need to analyze data at the most granular level, pre-aggregate it. For instance, if you only need to show sales by month, you can summarize your daily sales data into monthly totals before importing it.
  - **Use the Performance Analyzer:** Power BI has a built-in tool called the Performance Analyzer. It records the time it takes for each visual and DAX query to load, helping you identify and fix performance bottlenecks.
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## 7. What chart types do you use for trend analysis?

Trend analysis involves visualizing data over a continuous period to see how it changes over time. The best charts for this are:

- **Line Chart:** This is the most common and effective chart for showing trends. It connects data points over a continuous time interval (like days, months, or years), making it very easy to see patterns, growth, or declines.
- **Area Chart:** This is a variation of the line chart where the area beneath the line is filled

in. It's useful for not only showing the trend but also emphasizing the magnitude or volume of change over time.

- **Column Chart:** While also used for comparisons, a column chart is effective for showing trends over discrete time intervals (e.g., total accidents per day of the week or per quarter). It makes it easy to compare the magnitude of each period.
- **Combination Chart (Line and Column):** This chart combines a column chart and a line chart. It's excellent for showing the relationship between two different measures over time, for example, plotting the number of accidents as columns and the average severity as a line on the same chart.