

Group 8 BI Project- First Draft

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➤ **What are some of the problems that the company has?**

The company is currently grappling with a surge in nationwide road accident complaints, which are not only causing chaos but also resulting in tragic loss of human lives. In response to this pressing issue, the company is diligently working on reducing these accidents. To achieve this, they have taken steps to collect data from MassDOT for the National Road Safety Intelligence Bureau, which will be used to gain insights into the recurring patterns of these road accidents.

One of the key challenges we face is the occasional difficulty in obtaining data from all regions, leading to a reduction in the accuracy of our predictive models. This lack of accuracy poses a significant hurdle in our mission to prevent road accidents and increases the burden on the National Road Safety Intelligence Bureau. Additionally, connectivity issues with transportation authorities, stemming from inadequate infrastructure, hinder our ability to collaborate effectively with medical and law enforcement agencies.

The task of influencing legislative changes to enhance road safety can be particularly daunting, given that these matters involve both state and federal laws. Implementing changes in these domains requires extensive processing and time, making it a complex and time-consuming endeavor.

In light of these challenges, our focus has shifted toward Business Intelligence (BI) as a means to enhance road safety. We aim to integrate the data we have collected into a mobile application. This

app will utilize the longitude and latitude coordinates of accident locations to promptly dispatch paramedic services and towing assistance. The goal is to ensure the swift and efficient management of accident scenes without causing extended road closures.

It's important to note that the development of this app will take some time, as it entails a meticulous analysis of the collected data to identify patterns. Subsequently, the app will be built based on this information. The ultimate aim is to provide valuable support to various departments and agencies involved in road safety, addressing this urgent issue effectively.

➤ **What are the company's overall goals?**

The company is dedicated to a primary mission: raising awareness about road safety with the ultimate goal of reducing the number of accidents. We aim to achieve this by harnessing the wealth of data derived from past accidents. Through comprehensive data analysis, we intend to identify recurring trends and patterns, subsequently using these insights to disseminate critical information about road safety.

In addition to our core objective, our company is committed to addressing road safety concerns in collaboration with transportation authorities, law enforcement agencies, and other key stakeholders. Our collective aim is to enhance safety measures and mitigate the tragic consequences of road accidents.

Looking ahead, our long-term vision is to leverage Business Intelligence (BI) as a powerful tool for advancing road safety. We plan to integrate our data into a user-friendly mobile application, capable of utilizing the precise longitude and latitude coordinates of accident locations. This app will serve as a crucial platform for dispatching paramedic services promptly and coordinating

efficient towing operations. By doing so, we aim to minimize road closures and ensure the smooth functioning of affected areas, ultimately contributing to improved road safety.

➤ **How could Business Intelligence help the company to solve the problems?**

Our vision hinges entirely on the strategic utilization of business intelligence and data analysis. By meticulously gathering data on road accidents and applying advanced analytical techniques, we empower stakeholders to unearth invaluable insights. Through this process, they can then implement precise, targeted interventions aimed at enhancing road safety and mitigating the risks of accidents.

We firmly believe that harnessing business intelligence to scrutinize the data will unveil critical information about accident-prone scenarios. These insights will encompass factors such as road conditions, weather conditions, vehicle type, speed limits, lighting conditions, junction details, and more. This approach enables us to proactively address and rectify the conditions and circumstances that contribute to accidents, ultimately making our roadways safer for all.

➤ **What software does the company utilize? (e.g. Excel, SQL, Python, Tableau, etc.)**

At the National Road Safety Intelligence Bureau, our approach to data management and analysis is a well-structured process. We harness a combination of powerful tools to effectively address our mission of enhancing road safety.

We initiate our data collection process using Excel, where we gather historical information related to road accidents and safety incidents. To maintain this valuable data, we employ SQL databases, ensuring that we retain only the information essential for our specific use case, which is road safety data.

Data analysis is a critical step in our workflow, and we turn to Python for this purpose. Python allows us to conduct both descriptive and predictive analyses, providing us with actionable insights into road safety trends and potential areas of concern.

To present this data in a comprehensible and visually engaging manner, we utilize Tableau. This tool empowers us to transform our tabular data into insightful visualizations and interactive dashboards. These visuals are designed with the aim of making complex information easily understandable for our business stakeholders and partners in various agencies, thereby fostering effective communication and collaboration in pursuit of our organization's shared goals.

In the future, we are poised to expand our capabilities by incorporating APIs and application development. These elements will play a pivotal role in the realization of our earlier mentioned app, which is a key component of our ongoing efforts to improve road safety.

- **What are the logical components of the star schema? Or, if they do not have a Business Intelligence system in place, what would the components be in order to analyze data that is useful in solving the problems?**

At present, we do not have a Business Intelligence system in place, but we have organized our data based on the dataset we have. As a result of this structured schema, we can efficiently analyze and interpret insights from the data to address our road safety concerns. Here's how we can structure the logical components:

1. Fact Table:

- Fact table will contain quantitative data that we want to analyze. In this case, it could be a table named "Accident_Fact" with measures such as "Number_of_Casualties" and "Number_of_Vehicles."

2. Dimension Table:

- Create separate dimension tables for descriptive attributes:
- **Date Dimension:** This table can include attributes related to the accident date, such as "Accident_Date", "Day_of_Week" and "Time."
- **Location Dimension:** Store details about the location, including "Latitude", "Longitude", "Local_Authority_(District)" and "Urban_or_Rural_Area".
- **Weather Dimension:** Include attributes like "Weather_Conditions" and "Light_Conditions" related to the weather and lighting conditions during accidents.
- **Road Dimension:** This table can contain attributes such as "Road_Surface_Conditions", "Road_Type", and "Speed_limit."
- **Junction Dimension:** Include attributes like "Junction_Control" and "Junction_Detail" for information about road junctions.
- **Vehicle Dimension:** Store information about the involved vehicles, such as "Vehicle_Type."

3. Hierarchies:

- We can define hierarchies within dimension tables if needed. For example, in the Date Dimension, we create hierarchies like "Year > Month > Day."

4. Relationship:

- Establish relationships between the fact table and dimension tables using common keys. For instance, we link the "Date Dimension" to the "Accident_Fact" using the "Accident_Date" field.

5. Data Transformation and Cleaning:

- Ensure data quality by cleaning and preprocessing the data. This may involve handling missing values, correcting errors, and standardizing formats.

6. Data Analysis:

- Use data analysis tools like Excel, SQL, or Python to perform data analysis. We can calculate accident rates, identify trends, and derive insights.

7. Visualizations:

- Create charts and graphs to visualize our findings. Tools like Excel, Tableau, Python visualization libraries like matplotlib and seaborn can help us create visual reports.

8. Documentation:

- Document our data analysis process, findings, and insights for future reference and collaboration.

9. Communication:

- We can Share our findings and insights with relevant stakeholders, such as transportation authorities or law enforcement agencies, for collaborative efforts to improve road safety.

Through this simplified star schema structure, we can organize and analyze our data more effectively without using a full-fledged business intelligence system. A more advanced BI system may be used for better automation and scalability as the project progresses.