Digital Health
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Accident in Germany

1. Use Case: specific problem descriptions of all stakeholders involved (500 Words max.)

The stakeholders involved are Public Health Facilities, Road and Traffic Ministry, Public/Media

- **Public Health Facilities:** There is no clear representation of this data to help health institutions design interventions towards states with high road accidents to help make sure commodities needed for treatment are always available. This will help in preventing stockouts in the month with a higher record of accidents. If there is an increased number of accidents in the winter period due to the wear and slippery roads, health facilities will be able to make sure commodities are stocked during the period, as it is the peak period.

- **Road and Traffic Ministry:** This data can be used to tailor specific interventions to states with higher traffic accidents by analysing the data and coming up with appropriate measures. For instance, in instances where a road ramp can minimise drivers' speed, a road ramp will be built and a footbridge instead of a zebra crossing at some places, which could also reduce accidents. The ministry will be able to provide specific intervention in high accident areas, and areas with low accidents record can help with skills and tools in areas that are in need.

- **Public/Media**: lack accessible, well-tailored, visualised data to understand the numbers, and help create awareness or raise concern about road accidents. This hinders awareness in the public domain, such as schools, mass media, and individuals like parents. The media is able raise awareness if the data is well understood; for instance if data from winter period show that there is increase record of accident , the media can create awareness in that regards.

2. Solution: your pathway to finding a solution to the problem (1000 Words max.)

- **Problem identification:** to find a solution to a problem, there must be a proper analysis of the problem to truly know there is a problem that need solution. I have defined the gap available visualisation and my intended goal. I brainstormed accident

data and considered a new way to represent it to convey the intended message. I came into conclusion that with the state data, a reactive map will be well put to use as it will help people focus on a specific state at once if they want.

- **Tool (R Studio):** After identifying the problem, there must be critical thinking to select the right tool to solve the problem. In our digital world now, the use of AI is helping bridge problem-solving skills. Having basic knowledge of R and paired with AI, such as Claude AI, can help facilitate your solution. Anti-gravity, linked with the R Studio, is a great way to quickly code using Claude AI that is embedded in the platform.

- **Visualisation**: knowing how solve the problem with R Studio for a meaningful impact was already a good start for me. This includes the visual representation of the data and the communication channels, such as maps and graphs, and the interaction between my audience and platform. Shiny is a great tool to visualise data. I was able to change data in text and numbers to visuals, which made it more meaningful and impactful.

Eg: This helps with building interventions towards the current trends in Road traffic accidents by letting Health facilities procure to make sure commodities are in stock. Health facilities can stock commodities needed to treat people with road injuries and ensure there is always availability of these necessary commodities.

3. Implementation: description of the detailed steps you undertook to build the tool and the challenges that occurred on the way.

- **Source of Data:**
  I downloaded the road accident data from the GENESIS-Online, the main database of the German Federal Statistical Office. The data is available free of charge.

- **Cleaning of Data**
  I opened a new project in R Studio and linked it with my GitHub repository. I started by installing the packages, then imported the data into R Studio. I initially began cleaning the data manually into a long format for easier processing in R. This took quite a while, and a colleague also assisted. In R, I began by cleaning the names by renaming and rearranging the columns and rows. For instance, converting the data from "State and causalities" to a long format with R was straightforward and quicker, but I faced

difficulties finding the right command. Sometimes I know what I want to do but struggle with how to specify it for R to interpret. The casualties' data includes age, so I divided the age into six logical groups: minors, young drivers, middle-aged, mature adults, seniors, and unknown. I applied the same approach to the state data, organising it in a meaningful way.

- **Visualization**

I started by visualising my data using ChatGPT, but I kept getting many errors in the code. It was discouraging to continue the work. With a colleague's help, I discovered that Claude AI was better at understanding code. I use Antigravity and link it with RStudio. Claude was very helpful. I began visualising my data using a histogram, and I tried to refine and adjust it in a different direction, but it still wasn't what I wanted. I realised the histogram was not suitable for the data I have. I left it and planned to return later. I believed that the state data would greatly impact the audience with a German map illustration. The German Map showcases data for the states, and it turned out well, but it also came with reactive issues. I want the map to be able to appear isolated with a zoom in featured when I tap on a state, and also a tap-to-rest feature. Through solving these issues, I came to learn that I need to be detailed when instructing Claude AI on my problem and solutions. So, I went like this: when I clicked on a state, I would like it to be isolated from the other states; it should also zoom in; the data should be beside it for good visibility; the map should be a heat map, taking into consideration the data with the states, and I received exactly what I wanted. I used the German map with the health heat map to visually illustrate this data so the audience can react with the map, not just numbers and words. The heat map guides the audience to know exactly where there is less and more accidents without even seeing the numbers.

Using the same approach, I replaced the histogram diagram with a pie chart, which I believe was better with the data I have, and the data made sense. With the pie chart, you are able to see the number of each category of accident, totally 100%. Till now, the tap-to-rest feature has not work on all states. I tried several time but it continues to fail. I added a monthly trend using a heat map to pinpoint some of the danger zones. I believe this is also a great feature to help oversee the data over the years and by state. For example, in the casualties data monthly trend, you can see in that just by observing the passenger car data, has fewer accidents compared to the rest.

I also added a quick overview panel at the top to provide quick information just before people jump in to filter the data.

- **Aesthetics**

  To make the platform appealing to the eye, I used the orange and teal colour palette. These vibrant colours are used to draw attention to the specific segment of the platform while isolating them at the same time, and this is in line with the Visual Attention Theory, A feature-integration theory of attention. (Treisman & Gelade, 1980).

  I added an animation of an accident involving a human and a taxi, with an ambulance coming after. This is to add a little creativity and also inform the audience about what the platform is about without using words.