

**Software Design  
Document  
for  
Microsoft Power BI Data  
Analytics Dashboard**

**Version 1.0 approved**

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**Sponsor: Santa Barbara Public Defender**

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## Revision History

Name	Date	Reason For Changes	Version
Team	10/7/21	First Draft	1.0
Team	12/7/21	Update Project Design	1.1
Team	4/21/22	Populate more fields, administer final changes	1.2

# **1. Introduction**

## **1.1 Purpose**

The purpose of this document is to explain the technical attributes of the Santa Barbara Public Defender's Office Power BI Dashboard. The scope of this SRS includes multiple applications. The main purpose of this document is to describe how this software was developed and how it implements the needs of the Santa Barbara Public Defender's Office.

## **1.2 Document Conventions**

This document is written using Times New Roman font and with the font size 12, left align, and single spacing. We divided each topic by a number of subsections, and all of those topics and sections are highlighted by using bold fonts. Certain topics will require a clear understanding of a prior introduced requirement.

## **1.3 Intended Audience and Reading Suggestions**

This document is intended for students, the university faculty, developers, project managers, and other additional parties that may be involved with the software design documentation. The SRS documentation explains step by step in detail what our software is supposed to do. In order to further understand our product, we prefer software developers or relate it to read sections involving design considerations, architectural strategies, system architecture, and system design. For businesses like project managers involved, we would suggest they take a look at policies and tactics, and user interface to better understand the policies which could involve and the product function.

## **1.4 System Overview**

The product employs Microsoft's business analytics service's tools of "Power BI Desktop" and "Power BI Dashboard". For the service-side, the product initially requires exporting data from the database to Power BI Desktop. From Power BI Desktop, the data is organized and visualized. Upon completion of data visualization, the dashboard can be published and uploaded to Power BI Dashboard. For the client-side, users may visualize the data through a variety of charts in the dashboard. The data may also be drilled down to acquire deeper information or drilled upwards to go back to the previous data.

## 2. Design Considerations

### 2.1 Assumptions and Dependencies

It is assumed that the created dashboards will be available during some phase of the project's completion. Until then, dashboards shall only be presented to the sponsors and collaborators of the project for refinement purposes. It is also assumed that users have a basic understanding of navigating Power BI's interface. Users are required to have the Windows 7 OS or a newer rendition and Internet Explorer 9 or newer.

### 2.2 General Constraints

- Hardware or software environment
  - The Power BI service currently does not have a data cleansing option. Consequently, it falls upon the user to ensure that the data is of high quality.
  - The Power BI service is incapable of dealing with complex relationships between tables. Consequently, any created data model must have multiple unique fields to avoid recognition issues.
- Interoperability requirements
  - Power BI users with free licenses may not share or publish content with any other users. Content may be distributed to them only when the workspace is set to Premium capacity.

### 2.3 Goals and Guidelines

The main goal of the system's software is to publish useful data and enable customers to better understand data. To achieve this goal it requires following rules.

- The chart should not be nonsense, make it like a story and try to find the relationship between the data.
- The Software has a mandatory delivery date that must be met.
- Update the chart when the database updates.
- The dashboards should be easy to read and understand how to interact with.
- The dashboards should contain internal and external dashboards depending on the intended audience.

## 2.4 Development Methods

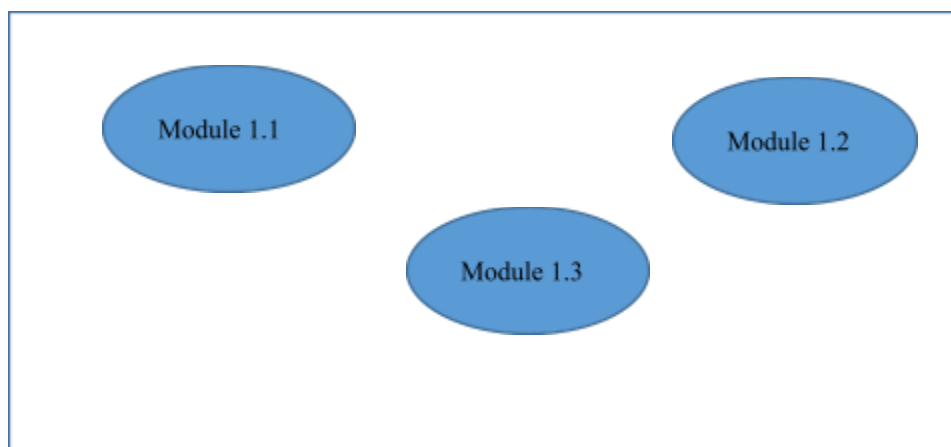
The method used for this software design was WaterFall development. During the meeting we would talk with SB public defender to go over requirements. After meetings our group would design and implement features. Following week we would meet with the SB public defender and professor to verify.

## 3. Architectural Strategies

These following decisions and/or strategies were used to improve the overall organization of the system.

- PowerBI is an interactive data visualization software product developed by Microsoft and it is a great tool to access, organize and visualize data.
- A Microsoft SQL server was used to store the data because it increases data security and ease of configuration, as opposed to Excel, which was used previously to store any data. Microsoft SQL is faster and can handle large loads of data.

## 4. System Architecture



## 5. Policies and Tactics

### 5.1 Choice of which specific products used

Database provided by CalStateLA: cs3.calstatela.edu

(please note that the final database will be the Santa Barbara's own database called eDefender)

### 5.2 Plans for ensuring requirements traceability

Req #	Name	Type	Status	Release	Test Traceability	Requirements Traceability
N/A	N/A	N/A	N/A	N/A	N/A	N/A

### 5.3 Plans for testing the software

#### 5.3.1 Engineering trade-offs

Engineering trade-offs that have been made are the choices of software that is utilized. Microsoft Power BI and Microsoft SQL Server Management Studio 18. The liaison has decided to use Microsoft Power BI given it's ease of interaction with various database warehouses. However, when it comes to data visualization, Microsoft Power BI lacks certain features to create more intricate visuals, especially in the case of using machine learning to show predictions. Our team has decided to use Microsoft SQL Server Management Studio 18 as we are already familiar with SQL and can work efficiently with it. Microsoft SQL Server Management Studio 18 also has the benefit of easily being accessible by Microsoft Power BI when pulling data from SQL databases. Since we are focusing on SQL with our databases, the use of other database related programming languages may be difficult.

#### 5.3.2 Coding guidelines and conventions

The coding guidelines and conventions that were followed were the following:

- Shall write a Column in the format TableName[Column Name]
- Shall write a Measure in the format [Measure Name]
- Table names have space between them.
  - Ex. 310 'Attorney Type & Location\$'
- Column name within the table does not have space.
  - Ex. fullName
- Give your tables, columns and measures descriptive business names without overly short abbreviations.

### 5.3.3 The protocol of one or more subsystems, modules, or subroutines

The protocol used when using Microsoft SQL Server Management Studio 18 is TCP/IP. This protocol is used whenever new data is uploaded or existing data needs to be updated or modified in any way

### 5.3.4 Plans for maintaining the software

The next set of seniors to be assigned this project will continue using Microsoft Power BI and Microsoft SQL Server Management Studio 18 in order to keep consistency with how the current senior group managed the data visualizations and database. Documentation on how data visualizations are created and how data is stored in the database has been created for the next senior group to use as a guideline to help with the maintenance of this project by providing consistency.

### 5.3.5 Hierarchical organization of the source code into its physical components (files and directories).

Data visualizations that have been created using the Microsoft Power BI software are saved onto a .pbix file. These files generally have the date that it was saved in it's title for organization and archival purposes. The database server are hosted by CSULA's servers and as such, that information about how the directory works in the database can not be provided. Whichever username that is used to store the database is up to the future senior group.

## **6. Detailed System Design**

### **6.x Name of Component (Module)**



**Microsoft SQL Database:** The database allows for the storage of important information about the client's information and the attorney's relevant information.

**Power BI Desktop:** The Power BI desktop allows for restructuring the information from the database to be converted into easy-to-use and understand visualizations.

**Power BI Web app:** The web app serves as a portal that allows users to upload visualizations created from Power BI Desktop to their online accounts. Users can share reports and visuals and create dashboards with said visuals.

**Power BI Dashboard:** The dashboard serves as the end product of what the users will be able to see and interact with.

### **6.x.1 Constraints**

Power BI is limited to the user's type of license; it restricts certain features such as enabling cross-work between team members. Another constraint prohibits the dashboard from being published online.

### **6.x.2 Composition**

N/A

### **6.x.3 Uses/Interactions**

PowerBI and a Microsoft SQL server collaborated throughout the project. In Power BI Desktop, a SQL server database was connected directly. Once the data was imported, the Navigator option was used to either load data or transform data in Power Query Editor. Once the data has been loaded and/or transformed, DAX functions in PowerBI are used to analyze data, and create new columns and measures. DAX (Data Analysis Expressions) is a formula expression language and can be used in different BI and visualization tools. Using DAX functions on any data will not affect the database.

### **6.x.4 Resources**

**Microsoft Sql Server Management Studio** - This application is used for configuring, managing, and administering all components within Microsoft SQL Server.

**SQL Queries** - The SQL Queries incorporate raw excel files and search up specific data we would want to see.

**Raw Excel Files** - The visualizations rely on the raw excel files given to us by the Santa Barbara Public Defender's team.

## **7. Detailed Lower level Component Design**

N/A - Not relatable to the nature of our project

## **8. Database Design**

The databases used by the software are from CalStateLA's own database cs3.calstatela.edu. It consists of accounts provided to us by our project advisor.

Server: cs3.calstatela.edu  
Database Username: cs4962stu02  
Database Password: r4W4KBuPs9Yt

\*Please note that stu03 has no database given to it as everything is done on stu02.

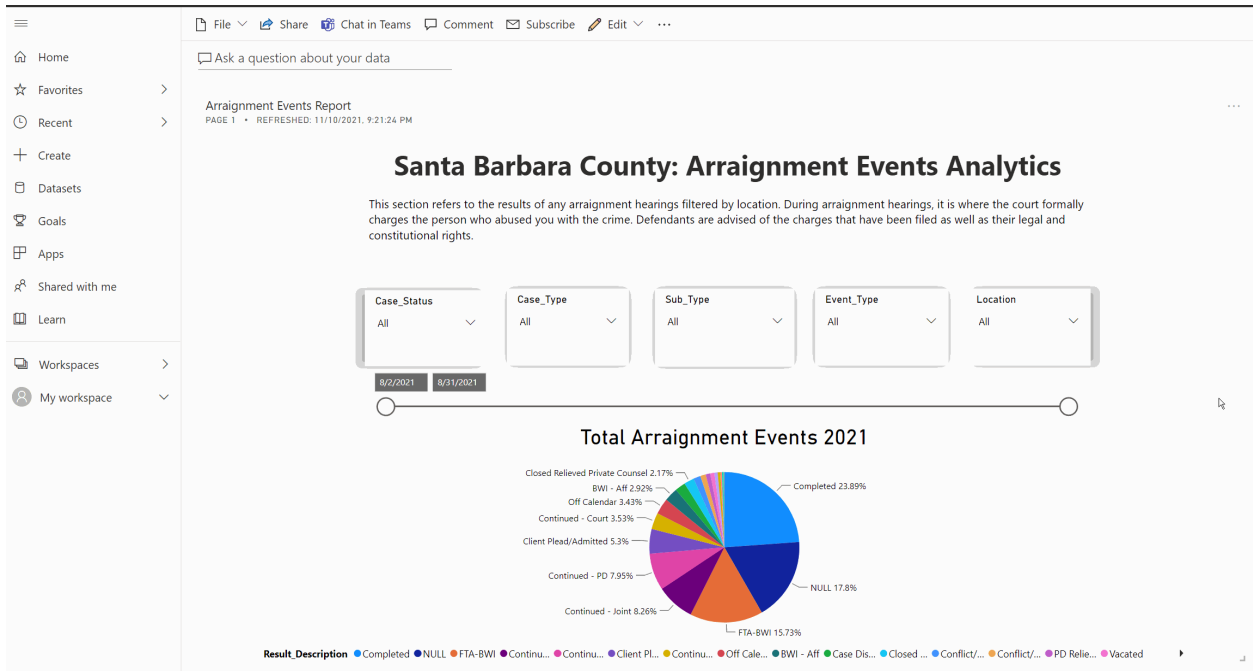
Server: cs3.calstatela.edu  
Database Username: cs4962stu03  
Database Password: 9iRzG1WGV3Es

## **9. User Interface**

### **9.1 Overview of User Interface (Power BI Desktop)**

The user will be able to access the dashboard on the website. The UI will be in a given format:  
The user will be able to see the visualizations of the data in the middle of the dashboard.  
The user will be able to see the title of the visualizations in the top center.  
The user will be able to interact with the visualizations with buttons located on the right-hand side.

### **9.2 Screen Frameworks or Images**

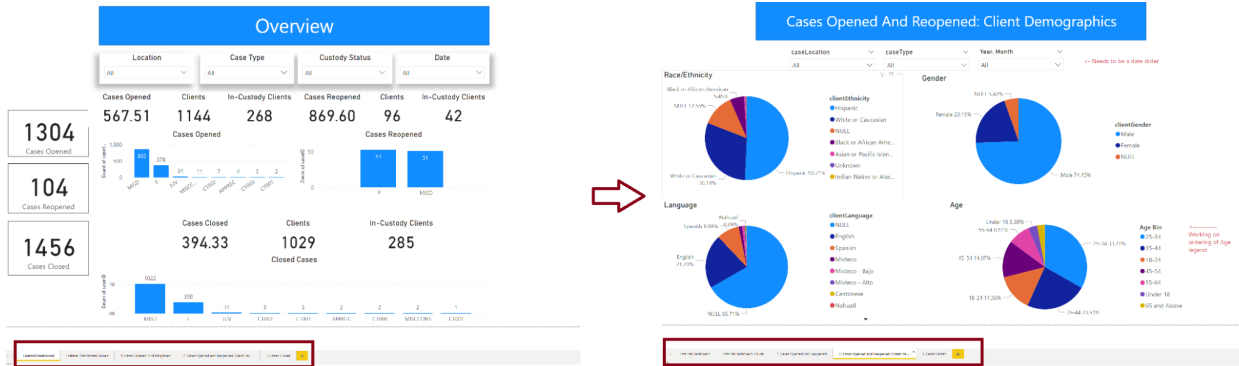


These can be mockups or actual screenshots of the various UI screens and popups.

### 9.3 User Interface Flow Model



Users can select checkboxes from the dropdown menu to filter data and change the dashboard to display different information



Users can also click on different tabs located on the bottom to navigate through different dashboards containing different visuals.

## 10. Glossary

**Slicers:** Interactive filters that narrow a portion of the dataset shown on visualization on a report

**Drill throughs:** Tool that allows users to focus on a specific part of a dataset.

## 11. References

Brad Appleton - <http://www.bradapp.net>

Purdue University - Department of Computer Science

[https://www.cs.purdue.edu/homes/cs307/ExampleDocs/DesignTemplate\\_Fall08.doc](https://www.cs.purdue.edu/homes/cs307/ExampleDocs/DesignTemplate_Fall08.doc)

PowerBI documentation - <https://docs.microsoft.com/en-us/power-bi/fundamentals/>