PROJECT REPORT

Team ID	**PNT2022TMID04331**
Project name	**Analytics for Hospital Health Data**

1. INTRODUCTION

1.1 Project Overview

- Data analytics in clinical settings attempts to reduce patient wait times via improved scheduling and staffing, give patients more options.
- By leveraging population health data to identify which patients are most at risk, it is possible to decrease readmission rates and improve patient convenience when making appointments and receiving care.

1.2 Purpose

This is the aim of healthcare data analysis: to use data-driven results to forecast and solve a problem before it is too late, as well as to evaluate procedures and treatments more quickly, keep better track of inventories, involve patients more in their own health, and provide them the means to do so.

2. LITERATURE SURVEY

2.1 Existing problem

No remote access

- Healthcare is associated with in-person consultations. This problem obligates the patients to run to the nearest healthcare center for treatment.
- The COVID outbreak and lockdowns made it even worse.
- The contagion effect of the virus restrained people within the four walls of their

home.

- So what do they do if they have an emergency and need to visit a doctor? To keep ahead in the fight for technological adoption, the requirement for remote access or virtual consultations is urgent and must be addressed.

Insufficiency and errors in data sharing

- So what do they do if they have an emergency and need to visit a doctor? To keep ahead in the fight for technological adoption, the requirement for remote access or virtual consultations is urgent and must be addressed.
- This is not just a hurdle in medical science; it causes regression because of the waste it generates.
- Not only do patients pay the price in the form of inconvenience and health, but we also see a rise in administrative expenses and litigation owing to these inefficiencies and errors.

  An incomplete or inefficient exchange of this data can be dangerous in patients needing urgent or complicated treatment.

Absence of supply management system

- Traditional supply chain management is often wasteful and inefficient.
- It leads to money wasted on lost and damaged inventory, improper delivery of equipment or medication, and the damage caused to patients, all of which amount to massive financial losses for healthcare services.
- Without an effective supply management system, hospitals are the epicentres of costly operations due to supply shortages, lost inventory, and subpar shrinkage prevention measures.

Data security

- Data security was a further issue that several respondents raised. Healthcare data breaches harmed 70% of the U.S. population between 2009 and 2020; this trend is unlikely to change
- Cigarillo believes the healthcare industry needs government funding to strengthen their IT resources.

- But there are also a number of best practices healthcare organizations can implement now that will help them more effectively secure valuable healthcare data, such as educating healthcare staff, restricting access to data and applications, implementing data usage controls, and more.

Lack of real time situation management

- True crises used to be few and far between, but the past year haspresented a perpetual state of crisis—a scenario that has posed an incredible challenge for healthcare organizations.
- Public health catastrophes like COVID-19, according to Terry Zysk, CEO of LiveProcess, necessitate scenario management, which entails employing real-time data analysis to comprehend how an event is happening and responding to it accordingly.
- It's the only way that critical healthcare resources can be delivered to the right people at the right time during emergencies and natural disasters.
- Hospital management systems have a significant flaw in that they don't allow users access to the kind of real-time analytics that may speed up reaction times and outcomes, such as the number of beds available at any one time or the location of vital supplies.

2.2 References

TITLE: Healthcare

AUTHOR: Dr.leena V Gangloi

TITLE: Information System Healthcare Sectors

AUTHOR: Wager

TITLE: Data Analytics in Healthcare

AUTHOR: J. Archenaa

TITLE: Historical Review Of Health Policy Making

AUTHOR: Ravi Duggal

2.3 Problem Statement Definition

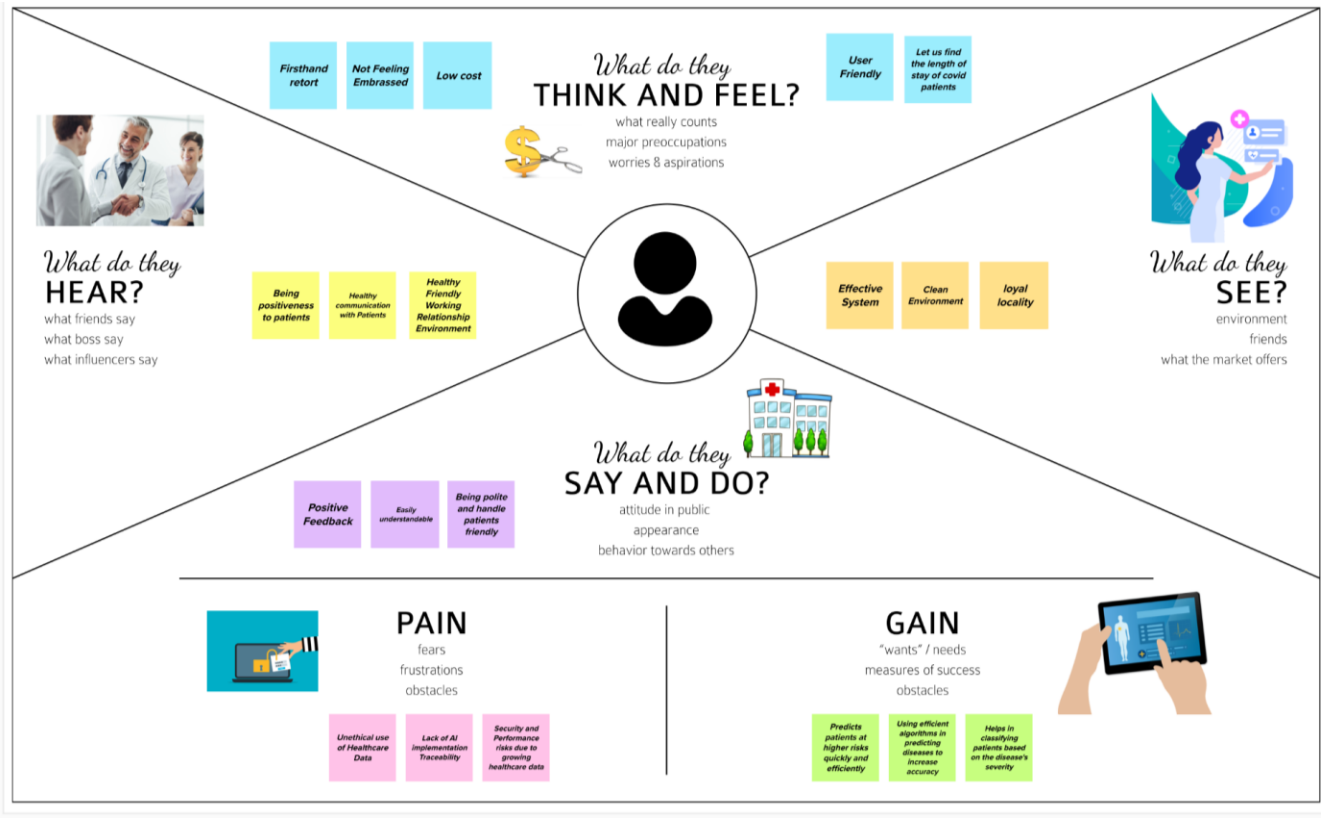
- Collection dataset.

- Upload the dataset into cognos.
- Open the properties->data module.
- If null value is present in character field use mode method.
- If the null value is present in continuous field use average or medium.
- Display the data in respective charts.
- Create conclusion using summary

3. IDEATION & PROPOSED SOLUTION

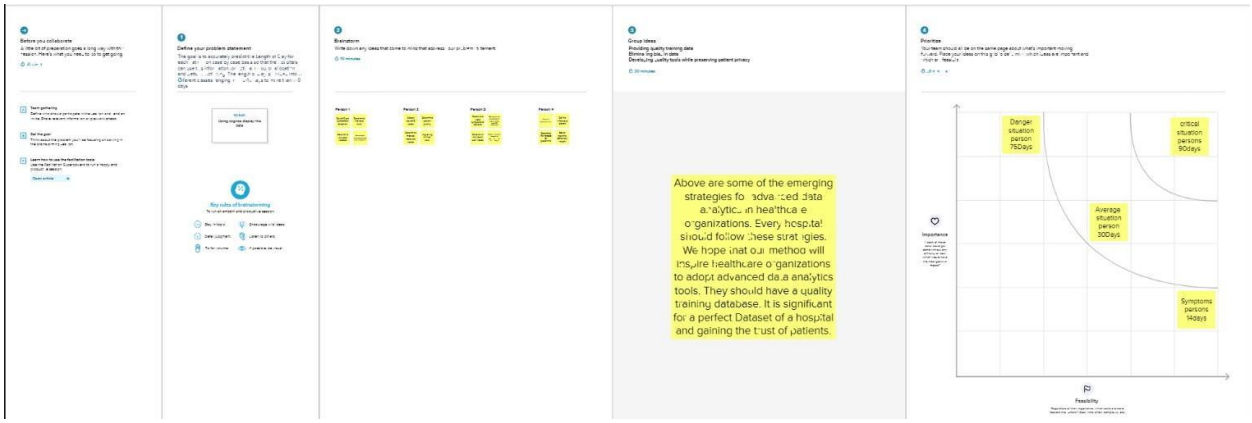
3.1 Empathy Map Canvas

- An empathy map is a tool which aids in understanding another person's perspective.
- Empathy maps have up until now not been used in a medical education setting. Objective: To assess the attitudes towards, applicability and usefulness of empathy maps as part of medical student's communication skills training.



3.2 Ideation & Brainstorming

To try to solve a problem or come up with new ideas by having a discussion that includes all members of a group : to discuss a problem or issue and suggest solutions and ideas.



3.3 Proposed Solution

- Identify key hurdles to healthcare sustainability in India and propose a set of solutions that mutually benefit and the pharmaceutical industry Pragmatic literature review of 43

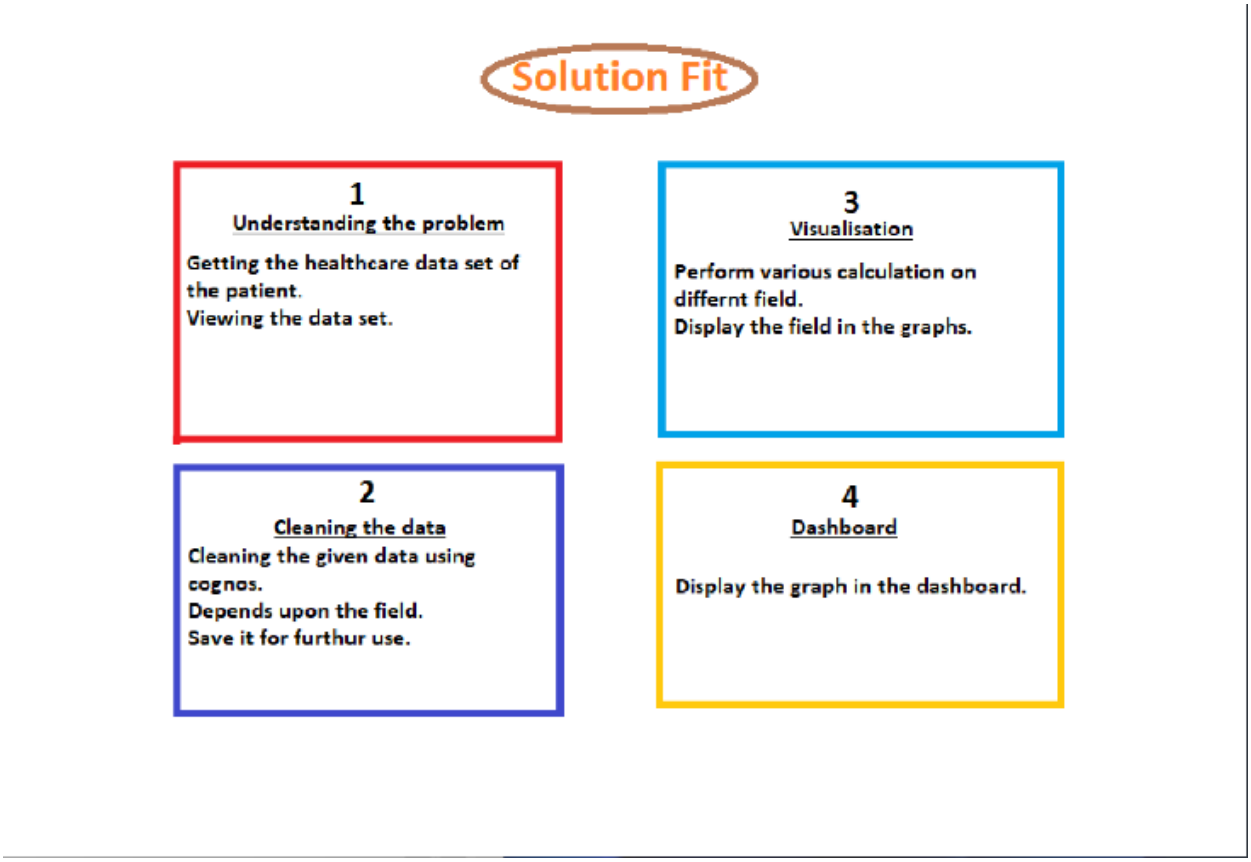
articles published by regional and international organizations.

- UNIVERSAL HEALTHCARE COVERAGE Attainment of UHC comes with the hurdle of having to provide care to a higher number of patients.
- EVOLVING DEMOGRAPHICS Population aging has resulted in a growing number of elderly dependents at higher risk of disease and complications.
- RISING COST OF R&D Today, the cost of developing a medicine can exceed USD 2.6 B compared to USD 179 M in the 1970s.
- WIN-WIN SOLUTIONS ARE NEEDED TO ATTAIN SUSTAINABILITY Mutually beneficial solutions that allow for productive movement towards sustainable value-based healthcare systems should be explored.
- VALUE ADDED SERVICES The pharmaceutical industry should move 'beyond the pill' and collaborate with to design and offer programs aimed at improving healthcare sustainability (e.g., training, administrative support, etc.
- MULTI-STAKEHOLDER COALITIONS Multi-stakeholder coalitions can serve as a platform to discuss healthcare challenges and co-create healthcare solutions to achieve defined common goals..
- INTEGRATED HEALTHCARE MODEL Investment in integrated healthcare systems that focus on prevention and early diagnosis is key to move towards sustainability in the LA region.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	1. Using cognos display the data graphical formate 2. Clean the data using cognos 3. Display the data in days like 1-10 or 11-20 etc.,
2.	Idea / Solution description	1. If numeric value is null perform average or mid value or repeated value 2. If String value is null perform repeated value
3. 1	Novelty / Uniqueness	Getting real time data to find out the high accuracy.It help to find out the result eassy
4.	Social Impact / Customer Satisfaction	Depend upon the Analytic patient is get teatment .Easily find out the patient health level.
5.	Business Model (Revenue Model)	In low cost we Find out the result and eassly get the result
6.	Scalability of the Solution	We Can use this solution for any type of age peoples

3.4 Problem Solution fit

- The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem.
- In an age where medical science has made noteworthy advancements, inefficiencies and healthcare errors are still persistent because of the healthcare industry’s traditional technology for management.
- One specific area of concern is the exchange of patient data in case of patient transfer from one department or hospital to another. Patient record sharing, when done the traditional way, is time-consuming and inefficient and exposes patient information to a breach.
- To deliver a holistic and satisfactory patient experience, different parties involved in healthcare – doctors, scheme providers, insurance providers, doctors, and patients – should be able to exchange information among themselves securely.



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

S.NO	Functional Requirements	Story
1	Data Gathering	Gathering data From kaagle
2	DB	Upload data in DB2
3	Connect DB with Cognos	Cleaning Data
4	Data Exploration	Explore the data in graphical format
5	Dashboard	Create Dashboard interactively
6	Report	Create report for variuous field
7	Story	Create story and animation

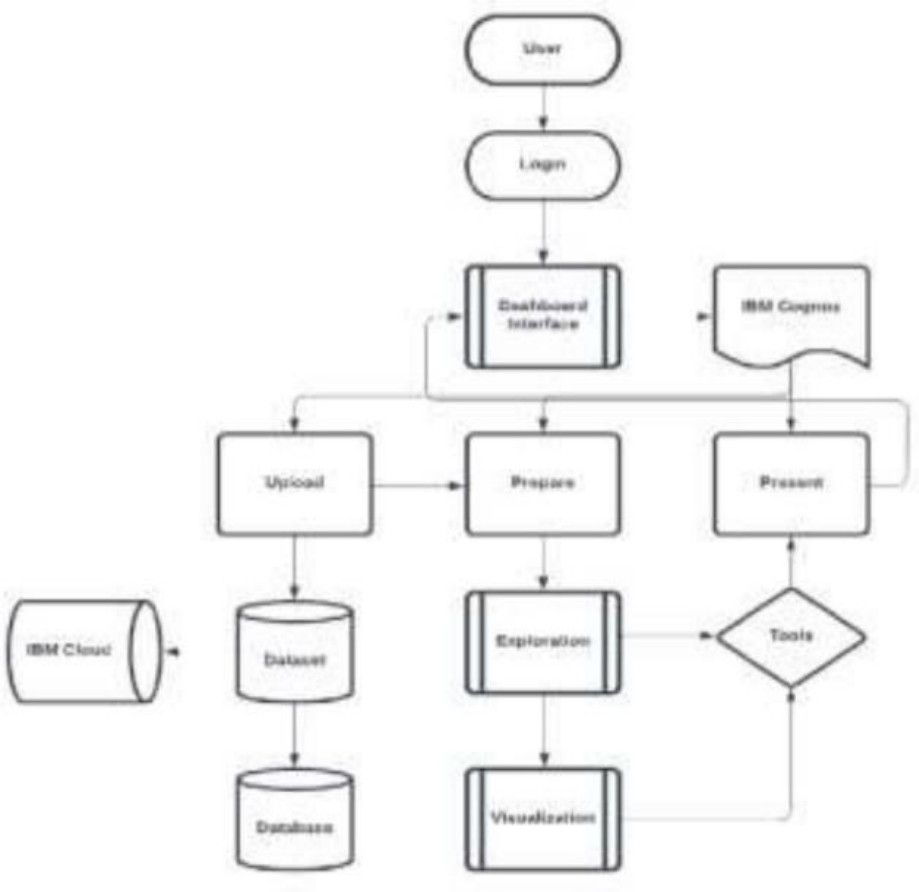
Non-Functional requirements

Working with open source plateform	**GitHub**
Prepare Step by Step process Doc	**Project Documents**

5. PROJECT DESIGN

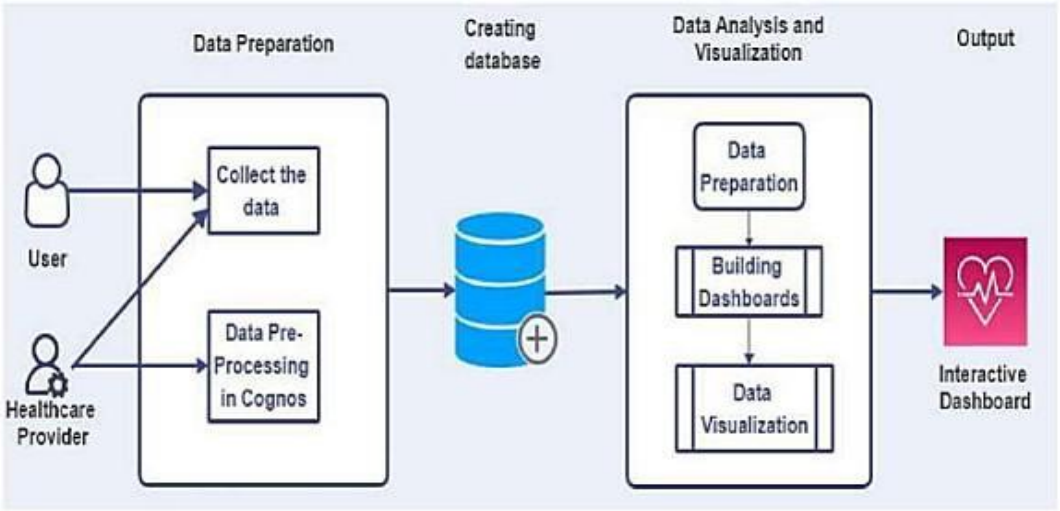
5.1 Data Flow Diagrams

A data flow diagram shows the way information flows through a process or system. It includes data inputs and outputs, data stores, and the various sub processes the data moves through. DFDs are built using standardized symbols and notation to describe various entities and their relationships.



Solution & Technical Architecture

- Solution Architects are most similar to project managers, ensuring that all parties, including stakeholders, are on the same page and moving in the right direction at all stages.
- Technical architects manage all activities leading to the successful implementation of a new application.



Components & Technology

S.NO	Components	Description	Technology
1	Dataset	Gathering dataset from Internet	Kaagle API
2	Data PrePocessing	Cleaning the gathered data	Cognos
3	Visualization	Visualize the data	Cognos Exploration
4	Dashboard	Create intractive Dashboard	Cognos Dashboard
5	Reports	Create intractive Report	Cognos Report
6	Story	Creating various Story	Cognos Story
7	Web Appliction	Creating embedded web application	Cognos ,Bootstrap,HTML
8	Database	Uploading data in DB2	IBM DB2

Application Characteristics

Cognos	It is a Plateform used to create ,display data in graphical format
DB2	It is a database used to store the data (MYSQL)

User Stories

S.NO	Funnctional Requirements	User Story Number	Tasks	Acceptance Criteria	Priority	Release
1	Data Gathering	1	Gathering Data	Using API	High	Sprint1
2	Pre-processing	2	Cleaning the data in proper format	Cleaned Data	High	Sprint 1
3	Data Exploration	3	Explore the data	Display data in graph	High	Sprint1
4	Dashboard	4	Creating various chart	Intractive Dashboard	High	Sprint 2
5	Reports	5	Creating report for various field	Intractive Report	High	Sprint 3
6	Story	6	Creating Animation Using picture	Various animation and slides	High	Sprint 4
7	Web Application	7	Cognos Embeded Web application	Intractive Web Application	High	Sprint 4

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	8	7 Days	22 Oct 2022	28Oct 2022	28 OCT 2022	28 OCT 2022
Sprint-2	8	8 Days	29 Oct 2022	05 Nov 2022	05 NOV 2022	05 NOV 2022
Sprint-3	5	3 Days	06 Nov 2022	08 Nov 2022	08 NOV 2022	08 NOV 2022
Sprint-4	5	4 Days	09 Nov 2022	12 Nov 2022	12 NOV 2022	12 NOV 2022

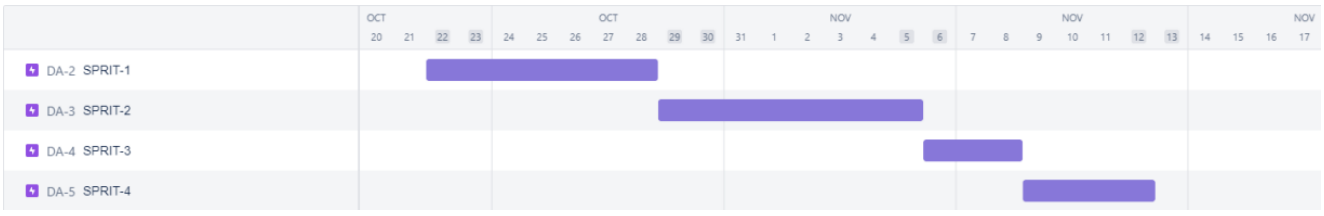
6.2 Sprint Delivery Schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Analyze	USN-1	As an admin, I will analyze the given datase. (Data preprocessing)	8	High	USMAN MATHEEN H
Sprint-2	Predict	USN-2	As an admin, I will predict the length of stay (Prediction)	8	High	MITHULADHITHYA S S
Sprint-3	Visualization	USN-3	As a user, I can select the visualization type (Creating visualization)	5	Medium	KARTHIKEYAN P
Sprint-4	Dashboard	USN-4	As a user, I can upload the datasets to the dashboard and view visualizations (Creating dashboard)	5	Medium	VISHWA P

6.3 Reports from JIRA

Road Map:

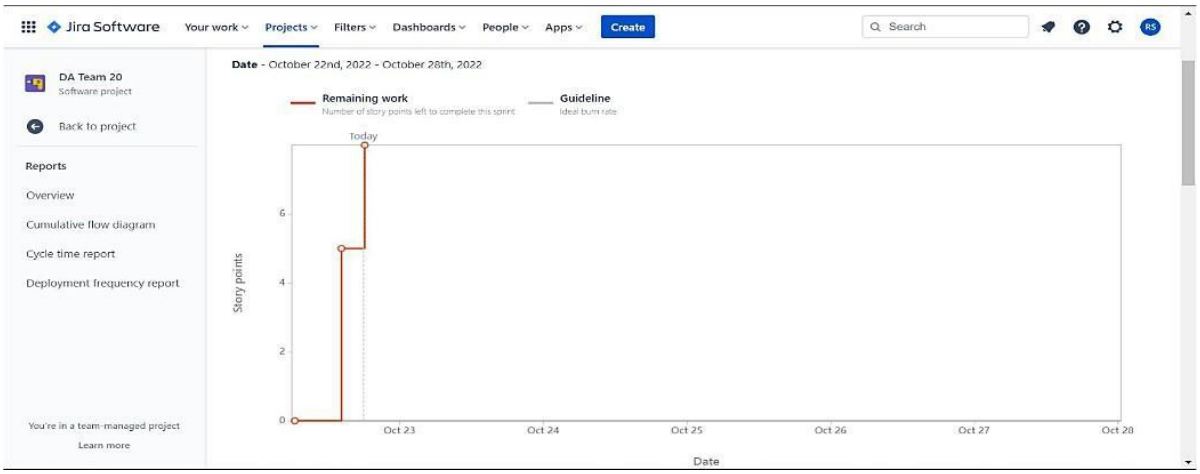
A roadmap is a strategic plan that defines a goal or desired outcome and includes the major steps or milestones needed to reach it. It also serves as a communication tool, a high-level document that helps articulate strategic thinking—the why—behind both the goal and the plan for getting there.



Kanban Board:

A kanban board is an agile project management tool designed to help visualize work, limit work-in-progress, and maximize efficiency (or flow). It can help bothagile and DevOps teams establish order in their daily work.

BURNDOWN CHART



VELOCITY

Average velocity for sprint - 1:

AV = 8/7 = 1.14

Average velocity for sprint - 2:

AV = 8/8 = 1

Average velocity for sprint - 3:

AV = 5/3 = 1.67

Average velocity for sprint - 4:

AV = 5/4 = 1.25

7. CODING & SOLUTIONING

7.1 Feature 1

- Fetched the data from DB2 database.
- Creating responsive dashboard.
- Inserting filter for each chart
- Creating report

7.2 Created reports using multiple graphs and charts

7.3 *Feature 2*

- Creating stories and performed.
- Perform animation render image from website.
- Included graphs and charts.
- Creating web application using bootstrap.
- Embedded the cognos with web application.

7.4 Database Schema

- case_id
- Hospital_code
- Hospital_type_code
- City_Code_Hospital

- Hospital_region_code
- Available Extra Rooms in Hospital
- Department
- Ward_Type
- Ward_Facility_Code
- Bed Grade
- Patient id
- City_Code_Patient
- Type of Admission
- Severity of Illness
- Visitors with Patient
- Age
- Admission_Deposit
- Stay

8. TESTING

8.1 Test Cases

- Verify user is able to see Home page.
- Verify user is able to see Dashboard page.
- Verify user is able to navigate to Report page.
- Verify user is able to navigate to story page.
- Verify filters are working

8.2 User Acceptance Testing

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	8	5	0	3	16
Duplicate	1	0	5	0	6
External	0	3	2	1	6
Fixed	13	4	3	16	36
Not Reproduced	0	1	0	0	1
Skipped	0	1	0	1	2
Won't Fix	1	4	2	1	8
Totals	23	18	12	22	75

3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

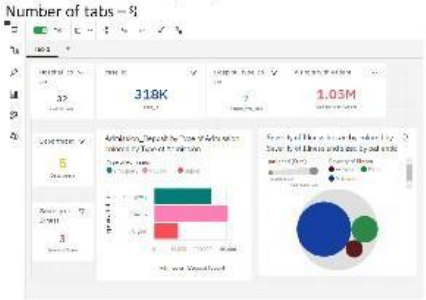
Section	Total Cases	Not Tested	Fail	Pass
Print Engine	9	0	0	9
Client Application	43	0	0	43
Security	1	0	0	1
Outsource Shipping	1	0	0	1
Exception Reporting	9	0	0	9
Final Report Output	10	0	0	10
Version Control	1	0	0	1

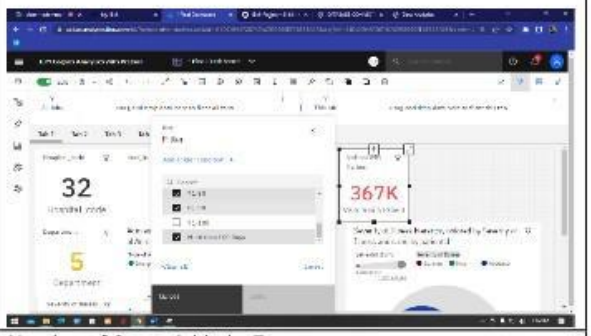
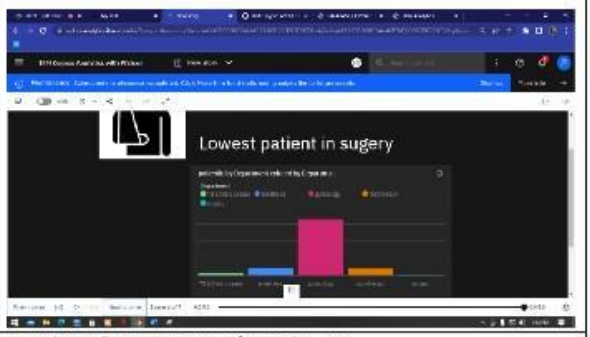
RESULTS

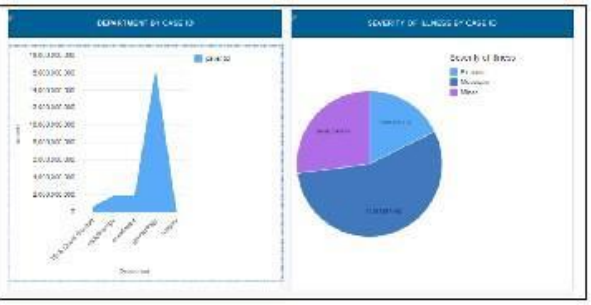
8.3 Performance Metrics

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	Number of Visulizations / Graphs – 22 Number of tabs – 5 
2.	Data Responsiveness	Data's will dynamically changed and graph also changed. 
3.	Amount Data to Rendered (DB2 Metrics)	Number of rows read – 318438 Number of rows loaded – 318438 Number of rows rejected – 0 

4.	Utilization of Data Filters	We created filters for Dashboards which is perfectly working. 
5.	Effective User Story	Number of Scene Added – 7 Animations are perfectly displayed. Images are perfectly rendered. 
6.	Descriptive Reports	Number of Visulizations / Graphs – 6

9. ADVANTAGES

- Improved research efforts
- Improved Health outcomes
- Obtain operational Insights \
- Improved staffing
- Informed strategic planning
- Higher-Quality Care

DISADVANTAGES

- Privacy
- Replacing Doctors
- Frustration with poor implementation.
- Cybersecurity risks
- Healthcare Regulatory Changes.
- Healthcare Staffing Shortages

10. CONCLUSION

- It also means describing how health plans, health care organizations, and clinicians should be accountable to patients and society and conversely. How individuals can take appropriate responsibility for their own health.
- Data analytics is the science of analyzing raw datasets in order to derive a conclusion regarding the information they hold.
- It enables us to discover patterns in the raw data and draw valuable information from them.

11. FUTURE SCOPE

- **Improved Decision Making**: Data Analytics eliminates guesswork and manual tasks. Be it choosing the right content, planning marketing campaigns, or developing products.
- Organizations can use the insights they gain from data analytics to make informed decisions. Thus, leading to better outcomes and customer satisfaction Data analytics to fulfill the commercial objectives of payers, insurers, physicians, hospitals, medical equipment manufacturers, sales representatives, and other stakeholders in the healthcare industry. Since the passage of the Affordable Act, this has become even more important.

12. APPENDIX

Index.html:

```
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>IBM Cognos Analytics Dashboard</title>
    <link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.2/dist/css/bootstrap.min.css"
        integrity="sha384-
xOolHFLEh07PJGoPkLv1IbcEPTNtaed2xpHsD9ESMhqIYd0nLMwNLD69Npy4HI+N"
crossorigin="anonymous">
    <style>
        @import
url('https://fonts.googleapis.com/css2?family=JetBrains+Mono:wght@300&display=swap');

        body,
```

```
        html {
            font-family: 'Playfair Display';
            height: 100vh;
        }

        .title {
            text-align: center;
        }

        #content {
            height: 100%;
        }

        #dashboard {
            height: 100%;
        }

        #report {}

        .iframe {
            height: 100%;
        }

        #navBarItem {
            padding-left: 20px;
        }

        .nav-item :hover {
            background-color: rgb(68, 68, 151);
            cursor: default;
            border-radius: 10px;
        }
    </style>
</head>
```

```
<body>
   <nav class="navbar navbar-dark bg-primary navbar-expand-lg">
      <button class="navbar-toggler" type="button" data-toggle="collapse" data-target="#navbarNav"
         aria-controls="navbarNav" aria-expanded="false" aria-label="Toggle navigation">
         <span class="navbar-toggler-icon"></span>
      </button>
      <div class="collapse navbar-collapse" id="navbarNav">
         <ul class="navbar-nav">
            <li class="nav-item active">
               <div class="nav-link" id="navBarItem" onclick="renderHome()" name="home">Home</div>
            </li>
            <li class="nav-item active">
               <div class="nav-link" id="navBarItem" onclick="renderDash()"
name="dashboard">Dashboard</div>
            </li>
            <li class="nav-item active">
               <div class="nav-link" id="navBarItem" onclick="renderRep()"
name="reports">Reports</div>
            </li>
            <li class="nav-item active">
               <div class="nav-link" id="navBarItem" onclick="renderStatus()"
name="reports">Story</div>
            </li>
         </ul>
      </div>
   </nav>

   <div id="content"></div>
</body>

</html>

<script>
```

```
const content = document.getElementById('content');
renderHome();
function renderHome() {
    content.innerHTML = `<div id="dashboard">
    <div class="title">
        <h1>IBM Nalayathiran Project</h1><br />
        <h1>Analytics for Hospitals' Health-Care Data</h1>
    </div>
    <table class="table">
        <thead>
        <tr>
            <th scope="col">Team Id</th>
            <th scope="col">PNT2022TMID04331</th>
        </tr>
        </thead>
        <tbody>
        <tr>
            <th scope="row">Name</th>
            <td>Akshay Prabu V S</td>
        </tr>
        <tr>
            <th scope="row">Name</th>
            <td>Amal Hadeez F</td>
        </tr>
        <tr>
            <th scope="row">Name</th>
            <td>Arun G</td>
        </tr>
        <tr>
            <th scope="row">Name</th>
            <td>Hareesh Raj R</td>
        </tr>
        </tbody>
    </table>
```

```
    </div>`
    }

    function renderDash() {
        content.innerHTML = `<div id="dashboard">
        <div class="title">
            <h1>IBM Cognos Dashboard</h1>
        </div>
        <div class="iframe">
            <iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.my_folders%2FDashboard&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;mode=dashboard&amp;subView=model0000018493a9d7e6_00000000" width="100%" height="100%" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
        </div>
    </div>`
    }
    function renderRep() {
        content.innerHTML = `<div id="dashboard">
        <div class="title">
            <h1>IBM Cognos Report</h1>
        </div>
        <div class="iframe">
            <iframe
src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FReport&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=run&amp;prompt=false" width="100%" height="100%" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
        </div>
    </div>`
    }
    function renderStatus() {
        content.innerHTML = `<div id="dashboard">
```

```
        <div class="title">
            <h1>IBM Cognos Story</h1>
        </div>
        <div class="iframe">
            <iframe
    src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.my_folders%2Fstory&amp;cl
    oseWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded
    &amp;action=view&amp;sceneId=model00000184910944c8_00000000&amp;sceneTime=0"
    width="100%" height="100%" frameborder="0" gesture="media" allow="encrypted-media"
    allowfullscreen=""></iframe>
        </div>`
        }
    </script>
    <script src="https://cdn.jsdelivr.net/npm/jquery@3.5.1/dist/jquery.slim.min.js"
        integrity="sha384-
    DfXdz2htPH0lsSSs5nCTpuj/zy4C+OGpamoFVy38MVBnE+IbbVYUew+OrCXaRkfj"
        crossorigin="anonymous"></script>
    <script src="https://cdn.jsdelivr.net/npm/bootstrap@4.6.2/dist/js/bootstrap.bundle.min.js"
        integrity="sha384-
    Fy6S3B9q64WdZWQUiU+q4/2Lc9npb8tCaSX9FK7E8HnRr0Jz8D6OP9dO5Vg3Q9ct"
        crossorigin="anonymous"></script>
```

GitHub link

https://github.com/IBM-EPBL/IBM-Project-10912-1659244048

Project Demo Link

https://drive.google.com/file/d/1ZA_aWunPyP1R1H2CT7r__05xE0HeXRRW/view?usp=drivesdk