

PROJECT REPORT

Team ID	PNT2022TMID29546
Project name	Analytics for Hospital Health Care- 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.
- when scheduling appointments and receiving treatment, and reduce readmission rates by using population health data to predict which patients are at greatest risk.

1.2 purpose

- This is the purpose of healthcare data analysis: using data-driven findings to predict and solve a problem before it is too late, but also assess methods and treatments faster, keep better track of inventory, involve patients more in their own health, and empower them with the tools 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 homes.

- So, what do they do if they need to see a doctor and have an emergency? The need for remote access or virtual consultations is the need of the hour, which needs to be taken care of to stay one step ahead in the technology adoption race.

➤ **Insufficiency and errors in data sharing**

- 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.
- 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.
- Supply shortages, misplaced inventory, and less-than-stellar preventative measures regarding shrinkage, all play into the reality that hospitals are epicenters of wasteful operations without a proper supply management system.

➤ **Data security**

- Another challenge mentioned by multiple respondents was data security. Between 2009 and 2020, 70% of the U.S. population was affected by healthcare data breaches—a trend that isn't likely to go away.
- 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 has

presented a perpetual state of crisis—a scenario that has posed an incredible challenge for healthcare organizations.

- According to Terry Zysk, CEO of LiveProcess, public health emergencies like COVID-19 require situation management: using real-time data analysis to understand how an event is unfolding, and reacting 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.
- A major problem with hospital management systems is they don't provide access to the kind of real-time metrics that could improve response times and outcomes—for example, how many beds are available at a facility at any given time or the location of critical 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. Archana

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.

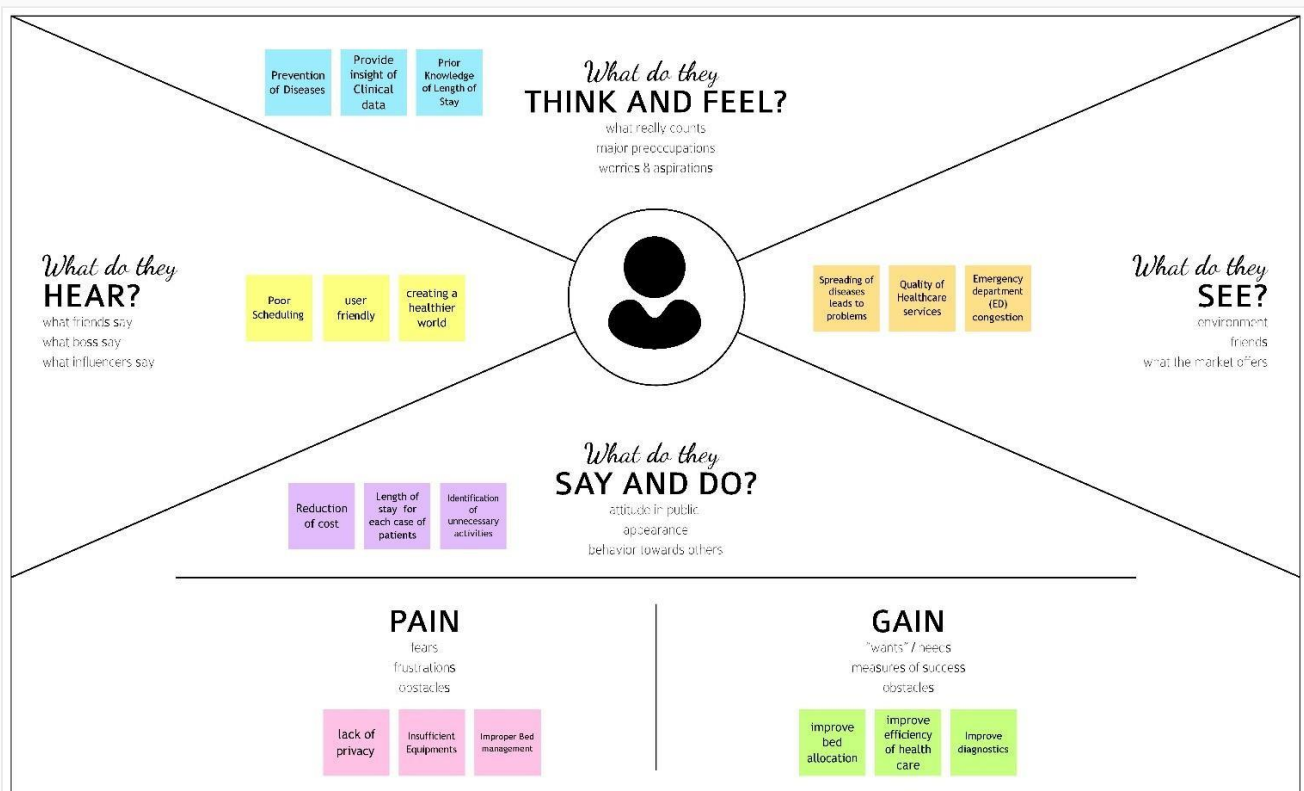
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Empathy Map Canvas

Gain insight and understanding on solving customer problems.

1

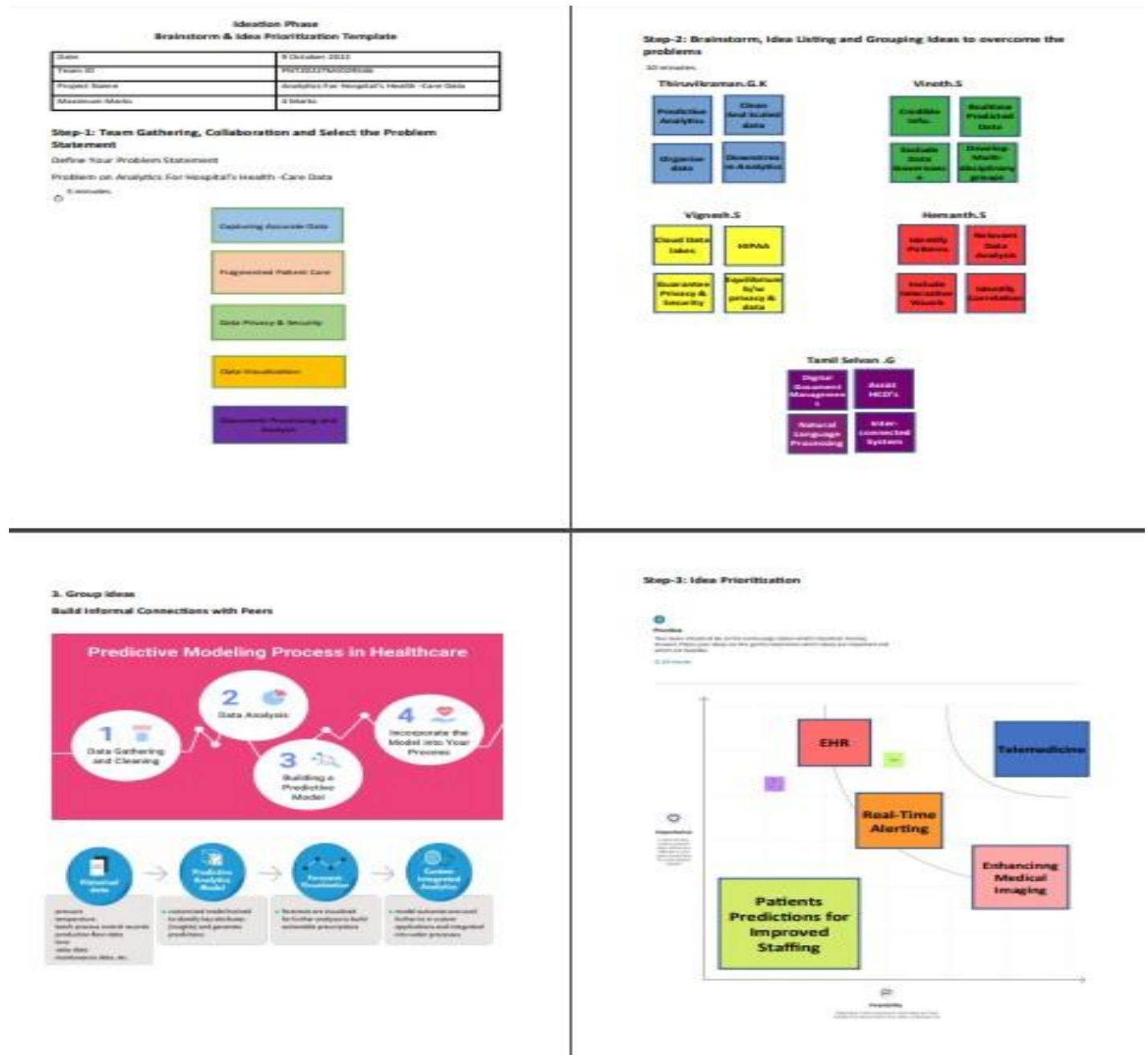
Build empathy and keep your focus on the user by putting yourself in their shoes.



Share your feedback

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.



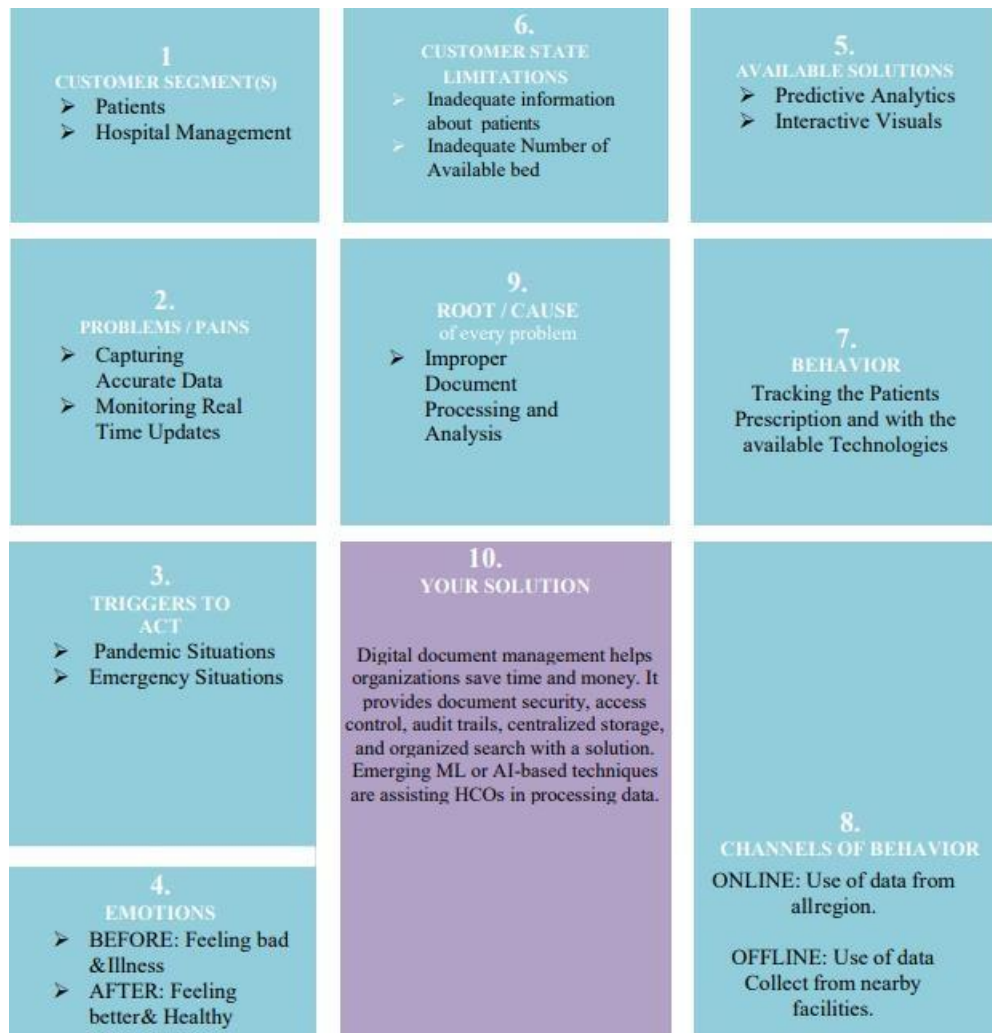
3.3 Proposed Solution

S.NO	PARAMETER	DESCRIPTION
1.	Problem Statement (Problem to be solved)	<ul style="list-style-type: none">• Data and analysis can go a long way, but health organizations must ensure that their data is used effectively.• Due to the uniqueness of health data and its measurement difficulties, it is crucial to choose the right analytical technology for healthcare.
2.	Idea/Solution description	<ul style="list-style-type: none">• Implementing new business models, meeting customer expectations, and adopting new regulations will not be easy, but building this database is the first step toward a patient-centric healthcare system.
3.	Novelty/Uniqueness	<ul style="list-style-type: none">• Data analysis is the next step in the evolution of health care, and it uses data-driven insights to predict and solve health problems.

S.NO	PARAMETER	DESCRIPTION
4.	Social Impact/ Customer satisfaction	<ul style="list-style-type: none"> When analyses patient data, health care providers are now able to see which treatments produce the best results.
5.	Business Model (Revenue Model)	<ul style="list-style-type: none"> Healthcare data analytics aims at reducing the cost of healthcare operations and processes. Hence, the treatment cost for patients will gradually go down.
6.	Scalability of the Solution	<ul style="list-style-type: none"> Modern big data platforms must be adapted to the specific demands of healthcare and designed for scalability and growth.

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 varuius field
7	Story	Create story and animation

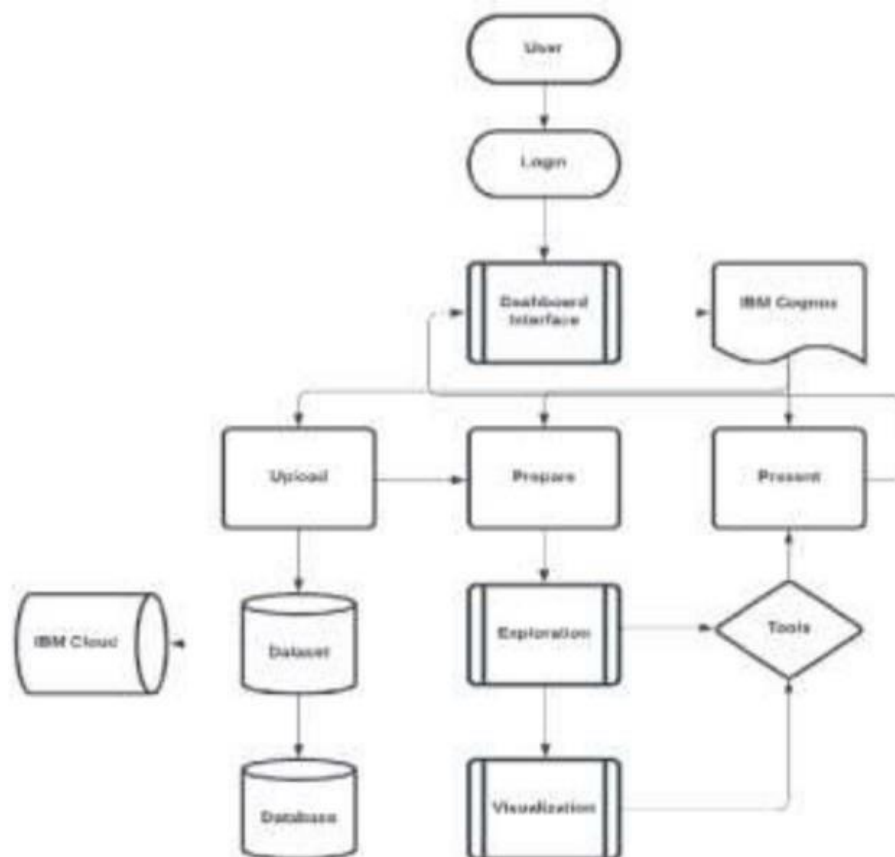
4.2 Non-Functional requirements

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

5. PROJECT DESIGN

5.1 Data Flow Diagrams

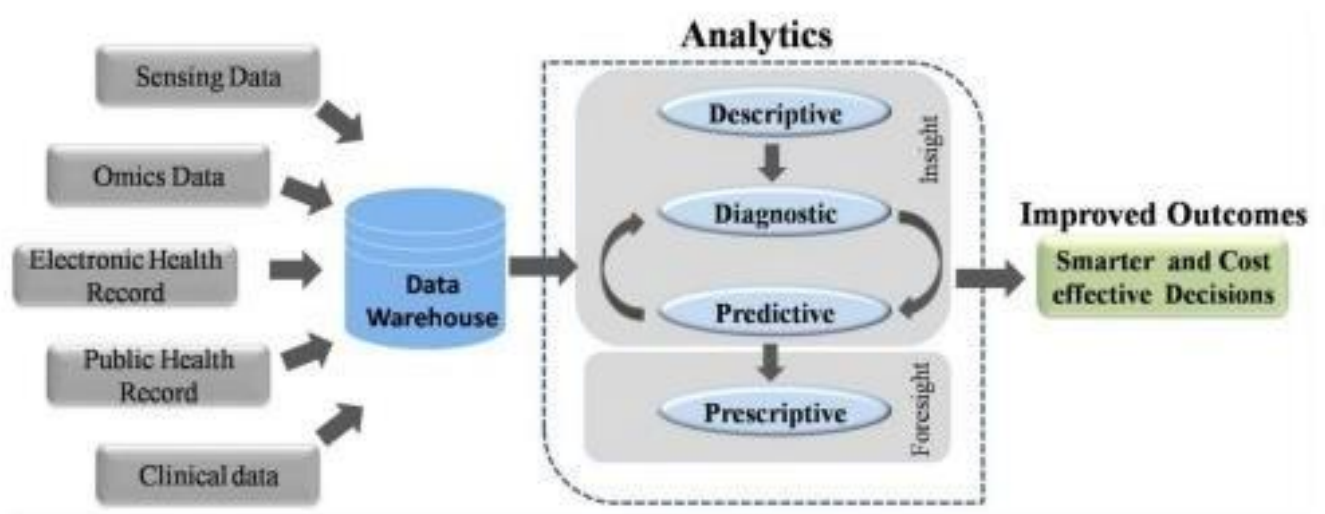
A data flow diagram shows the way information flows through a process or system. It includes data inputs and outputs, data stores, and the various subprocesses the data moves through. DFDs are built using standardized symbols and notation to describe various entities and their relationships.



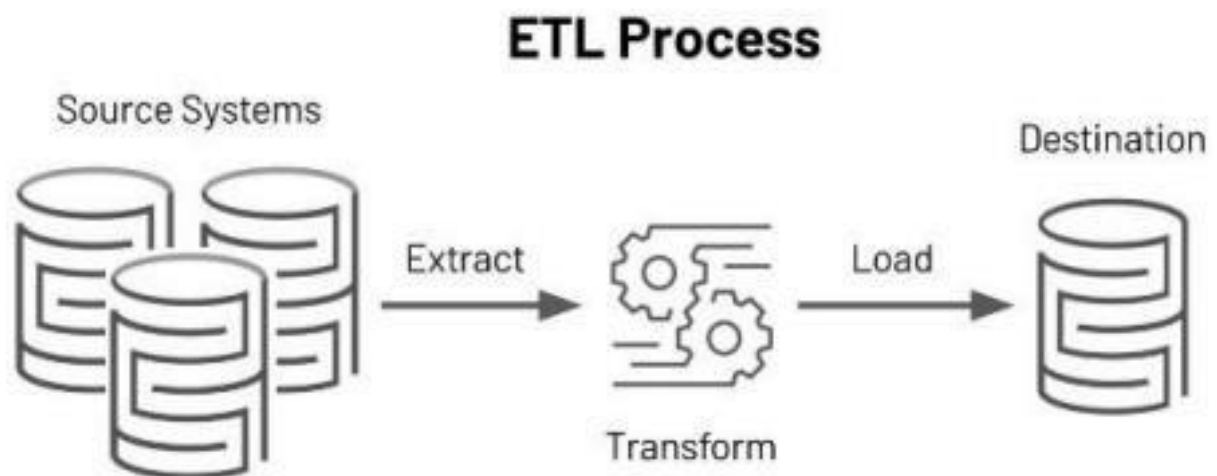
5.2 Solution & Technical Architecture

- 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.

SYSTEM ARCHITECTURE:



ETL PROCESS (DATA INTEGRATION PROCESS):



5.3 User Stories

S.NO	Functional 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

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	6 days	24 Oct 2022	29 Oct 2022	8	29 Oct 2022
Sprint-2	8	6 days	31 Oct 2022	05 Nov 2022	6	06 Nov 2022
Sprint-3	5	6 days	07 Nov 2022	12 Nov 2022	6	13 Nov 2022
Sprint-4	5	6 days	14 Nov 2022	19 Nov 2022	8	19 Nov 2022

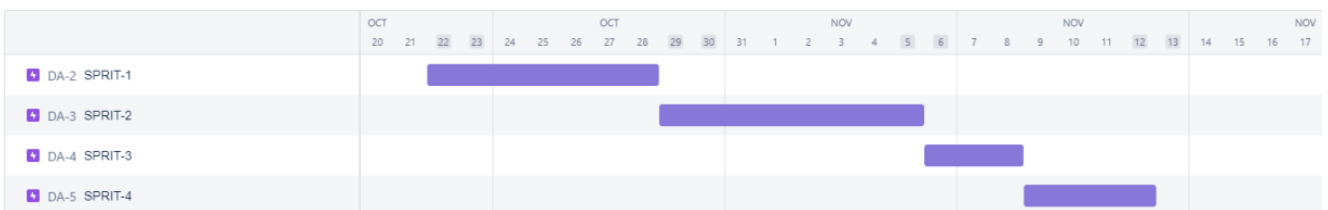
6.2 Sprint Delivery Schedule

Sprint	Functional Requirements	User story number	User story/task	Story points	Priority	Team members
Sprint-1	Analyse	USN-1	As a <u>a</u> admin I will analyse the given data set	8	High	Vignesh S
Sprint-2	Predict	USN-2	As a <u>a</u> admin I will predict the length of stay	8	High	Vinoth S
Sprint-3	Visualization	USN-3	As a user I can select the visualization type	5	High	<u>Thiruvikraman G K</u>
Sprint-4	Dashboard	USN-4	As a user I can upload the dataset to the dashboard and view visualization	5	High	Hemanth S <u>Tamil selvan G</u>

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.

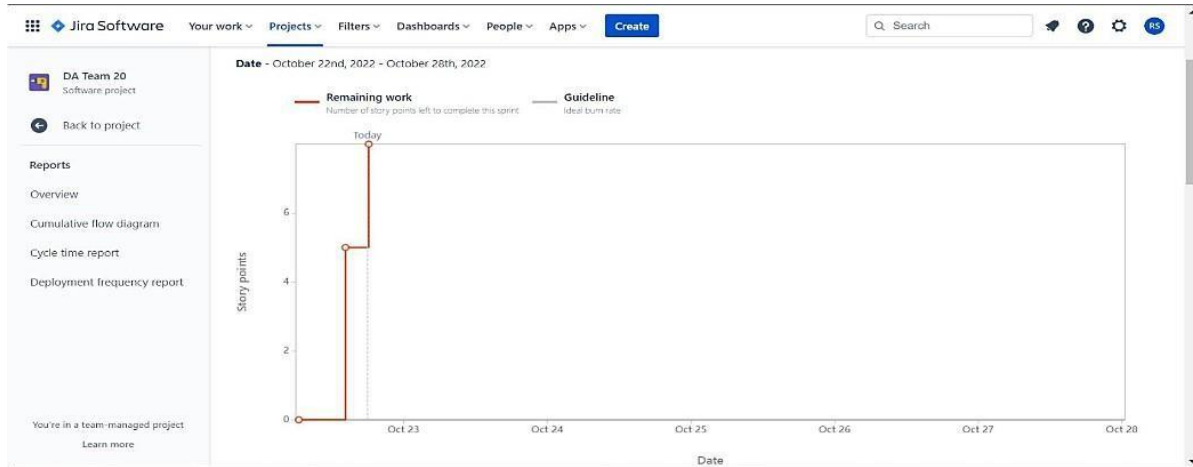


Kanban Board:

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 both

agile and DevOps teams establish order in their daily work.

BURNDOWN CHART



VELOCITY

Average velocity for sprint - 1:

$$AV = 3/7 = 1.14$$

Average velocity for sprint - 2:

$$AV = 3/3 = 1$$

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
- Created reports using multiple graphs and charts

7.2 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.

7.3 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 product is the responsive dashboard which shows Patient Length of stay in the hospital based on the various aspect considering:

1. severity of illness
2. based on the department
3. Type of admission
4. Region of hospital

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	6	3	1	0	10
Duplicate	1	0	0	1	2
External	1	4	1	2	8
Fixed	5	0	6	6	17
Not Reproduced	1	1	0	1	3
Skipped	1	1	0	0	2
Won't Fix	0	1	2	1	4
Totals	15	10	10	11	46

3. Test Case Analysis

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

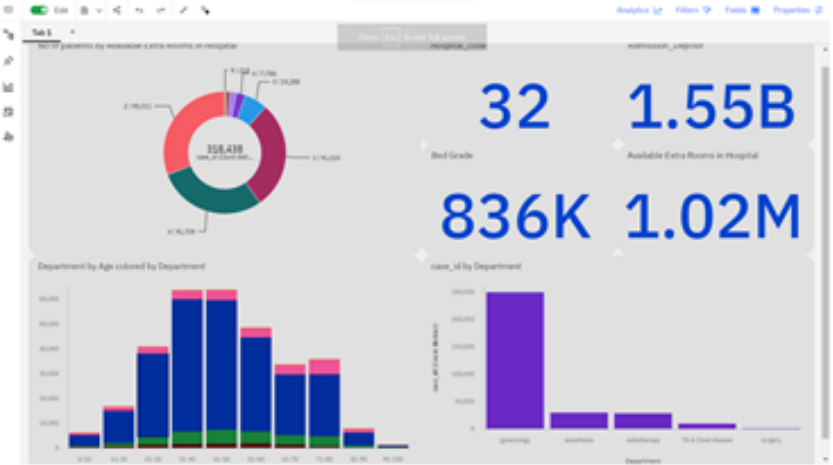
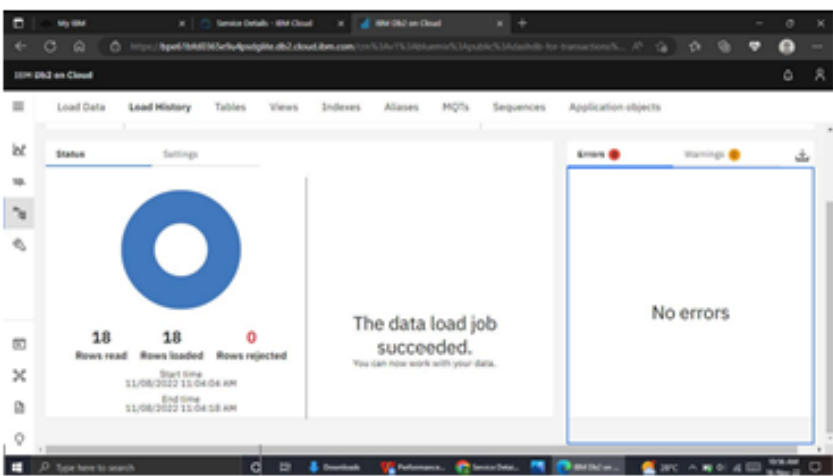
Section	Total Cases	Not Tested	Fail	Pass
design	5	2	1	2
dashboard	15	3	0	12
responsiveness	10	1	0	9
Exception Reporting	17	5	2	10
Final Report Output	13	4	1	8

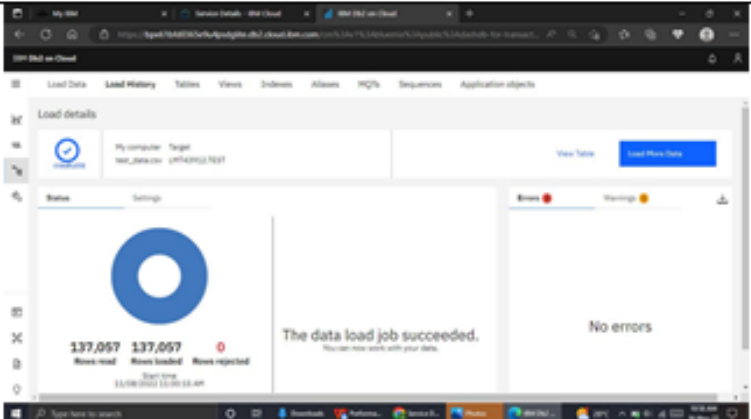
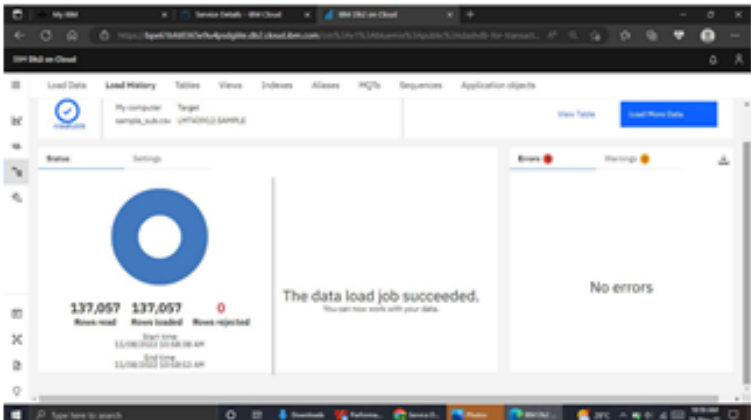
9. RESULTS

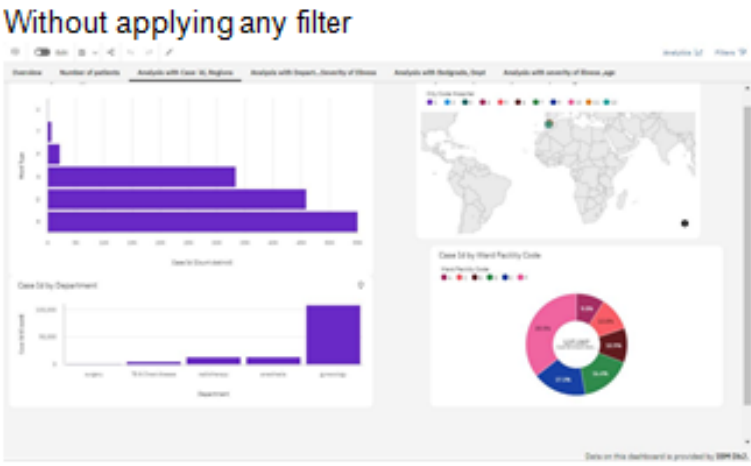
9.1 Performance Metrics

Model Performance Testing:

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

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	No of <u>Visualizations</u> / Graphs - 20
2.	Data Responsiveness	
3.	Amount Data to Rendered (DB2 Metrics)	

		 
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4.	Utilization of Data Filters	<p>Without applying any filter</p> 
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		<p>With Filter</p> <p>The dashboard displays the following data:</p> <ul style="list-style-type: none"> Case Id by Ward Type: A horizontal bar chart showing the distribution of case IDs across different ward types. The x-axis represents the number of cases, ranging from 0 to 120. Case Id by Department: A horizontal bar chart showing the distribution of case IDs across different departments. The x-axis represents the number of cases, ranging from 0 to 8,000. City Code Hospital for City Code Hospital regions: A map showing the geographical distribution of cases across different regions. Case Id by Ward Facility Code: A donut chart showing the distribution of case IDs across different ward facility codes. The total number of cases is 45,811.
5.	Effective User Story	No of Scene Added - 3
6.	Descriptive Reports	No of <u>Visualizations</u> / Graphs - 6

10. 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

11. 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.

12. 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
- achieve business goals of pharmaceutical companies, payers,

insurance companies, physicians, hospitals, medical equipment companies, sales reps, and other stakeholders in the healthcare business, need for this have only increased after the Affordable Act came into being.

13. APPENDIX

Source Code

Dashborad

html

```
<!-- DOCTYPE -->
<!DOCTYPE html>

<html lang="en">
<head>
<title>Data Analytics</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></script>
<script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>
</head>
<body>

<nav class="navbar navbar-inverse ">
<div class="container-fluid">
<div class="navbar-header">
<a class="navbar-brand" href="#">Analytics for Hospitals' Health-Care Data</a>
</div>
<ul class="nav navbar-nav">
<li><a href="index.html">Home</a></li>
<li class="active"><a href="#">Dashboard</a></li>
<li><a href="report.html">Report</a></li>
<li><a href="story.html">Story</a></li>
```



```

        </ul>
    </div>
</nav>

<div class="container">
    <iframe

src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FSprint%2B2%2FFinal%2BDashboard&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model00000184774a03ac_00000002"
width="1500" height="1000" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
</div>

</body>
</html>

```

Index html

```

<!DOCTYPE
html>

<html lang="en">

<head>

    <title>Data Analytics</title>

    <meta charset="utf-8">

    <meta name="viewport" content="width=device-width, initial-scale=1">

    <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
    <script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></scrip
t>
    <script
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            <li class="active"><a href="#">Home</a></li>

            <li><a href="dashboard.html">Dashboard</a></li>

            <li><a href="report.html">Report</a></li>

```

```

        <li><a href="story.html">Story</a></li>
    </ul>
</div>
</nav>

<div class="jumbotron">
    <center> <h4><i><b>Team ID : PNT2022TMID37553 </b></i></h4></center>

</div>

<table class="table table-bordered">

    <tbody>
        <tr>
            <td>Team Leader</td>
            <td>USMAN MATHEEN H</td>

        </tr>
        <tr>
            <td>Team member</td>
            <td>MITHULADHITHYA S S</td>

        </tr>
        <tr>
            <td>Team member</td>
            <td>VISHWA P</td>

        </tr>
        <tr>
            <td>Team member</td>
            <td>KARTHIKEYAN P</td>

        </tr>
    </tbody>
</table>
</body>
</html>

```

Report html

```

<!DOC
TYPE
html>

<html lang="en">
<head>

```

```
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<meta name="viewport" content="width=device-width, initial-scale=1">
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width="1500" height="1000" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
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Story.html

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    </ul>

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    width="1500" height="1000" frameborder="0" gesture="media" allow="encrypted-media"

    allowfullscreen=""></iframe>

</div>

</body>

</html>
```

GitHub link

<https://github.com/IBM-EPBL/IBM-Project-52311-1660995383>

DEMO VIDEO LINK

<https://youtu.be/zx399vr6BUU>