

# **Analytics for Hospitals Health-Care Data**

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## **1. INTRODUCTION:**

### **1.1 OVERVIEW:**

One of the promises of the growing critical mass of clinical data accumulating in electronic health record (EHR) systems is secondary use (or re-use) of the data for other purposes, such as quality improvement and clinical research.<sup>1</sup> The growth of such data has increased dramatically in recent years due to incentives for EHR adoption in the US. In the meantime, there has also been substantial growth in other kinds of health-related data, most notably through efforts to sequence genomes and other biological structures and functions.<sup>4</sup> The analysis of this data is usually called analytics (or data analytics).

Even though disease can occur in different forms, there is a common set of core risk factors that influence whether someone will ultimately be at risk for severe disease or not. By collecting the data from various sources, classifying them under suitable headings & finally analyzing to extract the desired data we can say that this technique can be very well adapted to do the analysis of health care data.

### **1.2 PURPOSE:**

Predicting and maintain the records in a particular order and visualize at anywhere anyplace in different regions simultaneously. Medicine and healthcare are two of the most important part of our human lives. Traditionally, medicine solely relied on the discretion advised by the doctors. For Example, a data of the monitored patient details and gathering the information about over the years can possibly done using this kind of process. Data plays a major role everywhere. Predictions are one the most important aspects, that is used for future purposes.

Collecting quality data from current patients means you can find similar potential customers and tweak your marketing campaigns and healthcare procedures accordingly. Better relations with your customers (in this case, your patients) is the key to success for healthcare facilities. Therefore, using electronic tools in the health care institution ensures safe and efficient data management.

## **2.LITERATURE SURVEY:**

### **2.1 EXISTING PROBLEM:**

In recent days, data plays a major role everywhere. But in healthcare section, lots of data were remained unnoticed, crapped and drafted due to rewrite. With the help of unnoticed or unused data, we can predict or determine valuable information that can be used for future purposes and we able to manage and organize the records in suitable ways.

In healthcare, big data analytics has the possibility of advanced patient care and clinical decision support. In this paper, we review the background and the various methods of big data analytics in healthcare. This paper also elaborates various platforms and algorithms for big data analytics and discussion on its advantages and challenges. This survey winds up with a discussion of challenges and future directions.

### **2.2 Problem Statement Definition :**

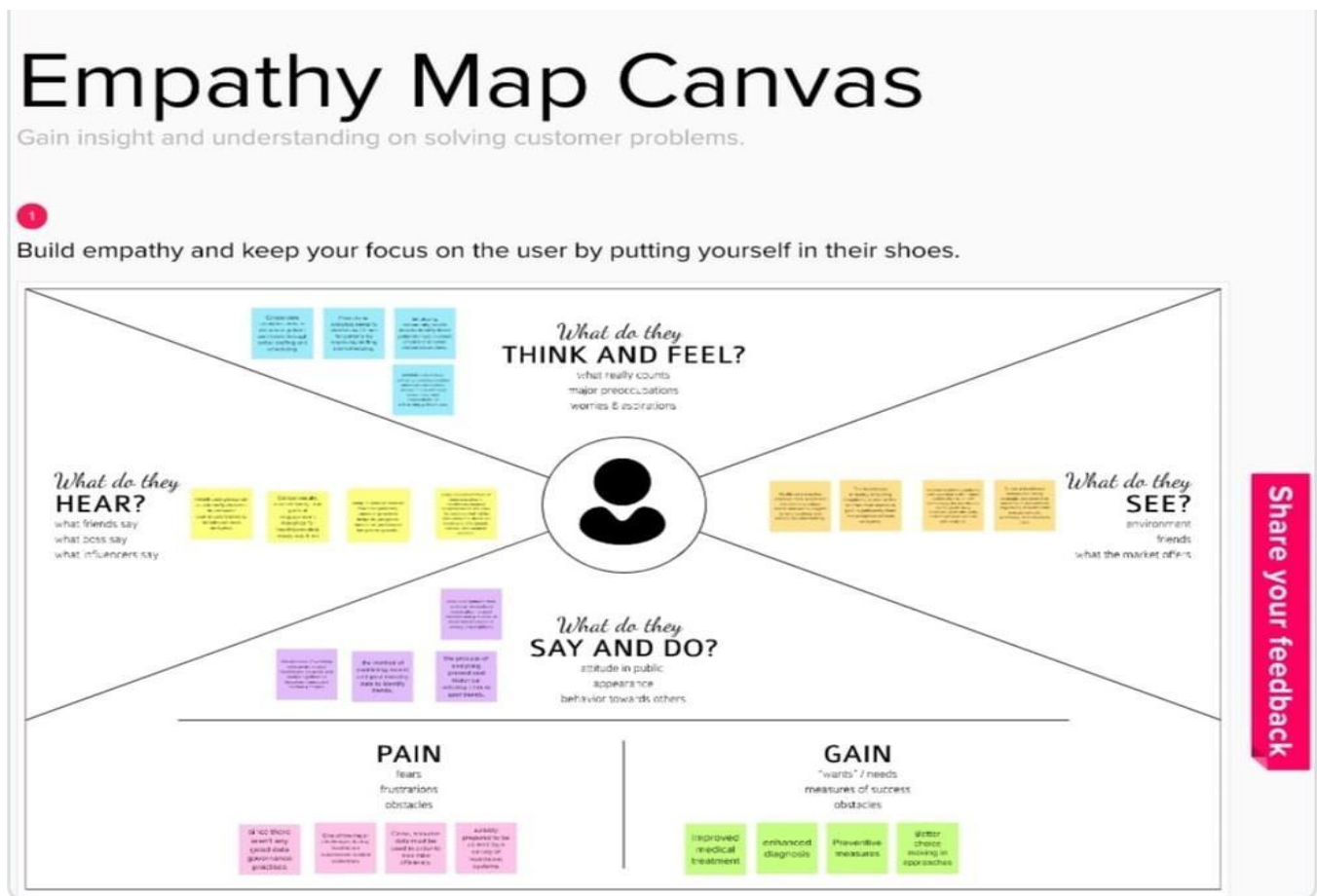
The major challenge in health care is its analysis. There are instruments available which can analyze health care data but either it is expensive or are not efficient to calculate chance of disease in human. Early detection of health care data can decrease the mortality rate and overall complications. However, it is not possible to monitor patients every day in all cases accurately and consultation of a patient for 24 hours by a doctor is not available since it requires more sapience, time and expertise.

Since we have a good amount of data in today's world, we can use various machine learning algorithms to analyses the data for hidden patterns. The hidden patterns can be used for health diagnosis in medicinal data. Between overwhelming hospitalization rates, intensifying cybersecurity threats, and an aggravating number of mental illnesses due to strict lockdown measures, hospitals are desperately searching for help. Big data in healthcare seems like a viable solution.

## 3.IDEATION & PROPOSED SOLUTION:

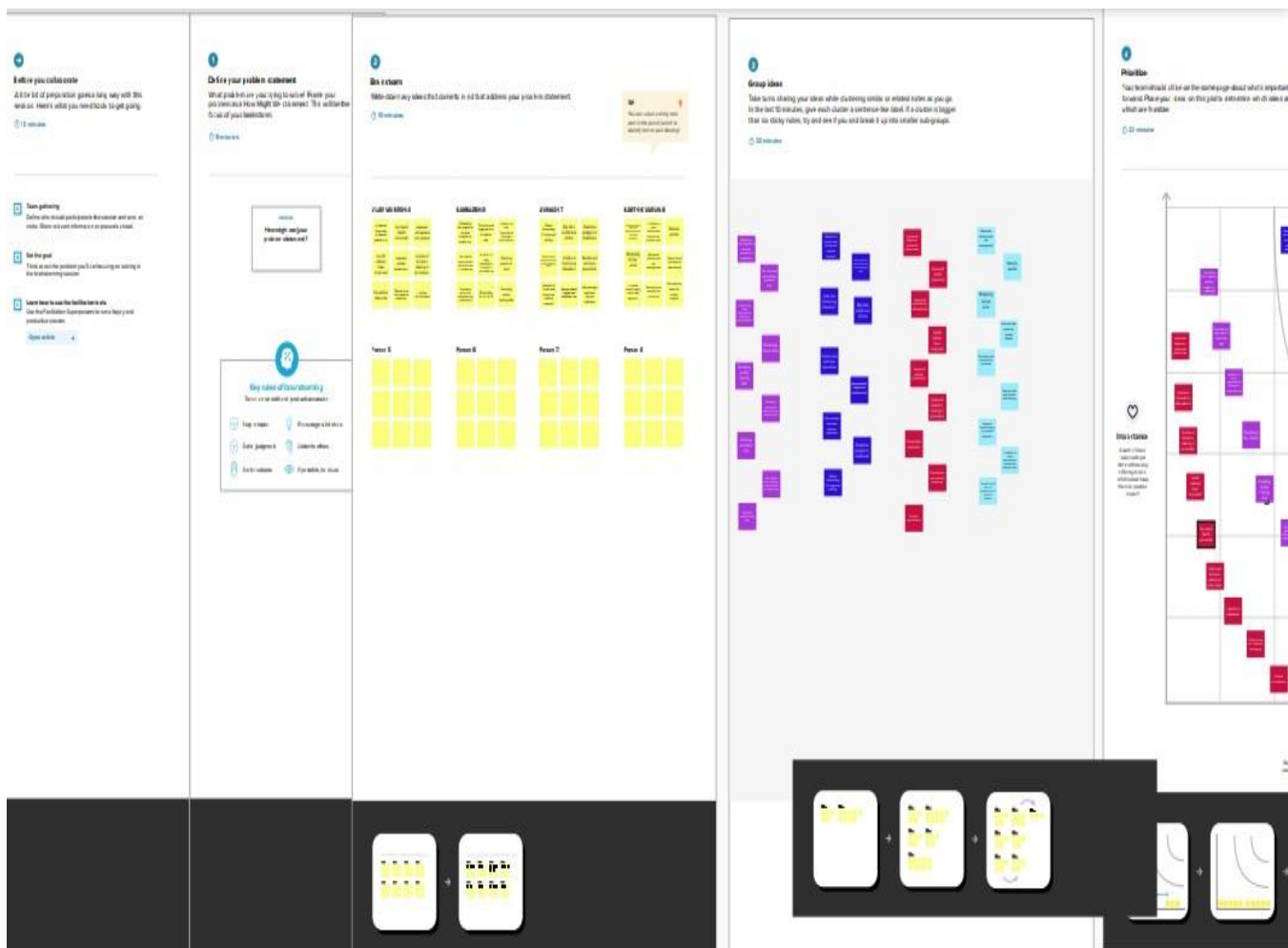
### 3.1 Empathy Map :

An empathy map canvas is a more in-depth version of the original empathy map, which helps identify and describe the user's needs and pain points. And this is valuable information for improving the user experience. Teams rely on user insights to map out what is important to their target audience, what influences them, and how they present themselves.



## 3.2 Ideation & Brainstorming:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich number of creative solutions.



### 3.3 Proposed Solution

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	EHR data matched patient-reported data in 23.5 percent of records in a study at an ophthalmology practice. Patients' EHR data did not agree in any way when they reported having three or more eye health complaints.
2.	Idea / Solution description	Predictive analytics can create patient journey dashboards and disease trajectories that can lead to effective, and result-driven healthcare. It improves treatment delivery, cuts costs, improves efficiencies, and so on.
3.	Novelty / Uniqueness	Healthcare data frequently resides in several locations, from various departments, such as radiology or pharmacy, to various source systems, such as EMRs or HR software. The organization as a whole contributes to the data. This data becomes accessible and usable when it is combined into a single, central system, such as an enterprise data warehouse (EDW).
4.	Social Impact / Customer Satisfaction	Enhanced diagnosis Improved medical treatmentImproved health results Improved relationships with patientsMore positive health indicators
5.	Business Model (Revenue Model)	The two factors that have the biggest negative effects on hospital income are claim denials and patient incapacity to pay their part. 90% more uncollectible claim denials were written off by hospitals and healthcare systems in 2017 compared to the preceding six years.
6.	Scalability of the Solution	A variety of institutions must store, evaluate, and take action on the massive amounts of data being produced by the healthcare sector as it expands quickly. India is a vast, culturally varied nation with a sizable population that is increasingly able to access centralized healthcare services.

## 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.

**Problem-Solution fit canvas 2.0** AMALTAMA

<p><b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span></p> <p>Who is your customer? i.e. working parents of 0-5 y.o. kids</p> <p>Various patient demographics, including risk level and insurance status, can be used to segment the patients. It is the method of classifying patients usually by age, gender, illness, belief, lifestyle</p> <p>Define CS, fit into CC</p>	<p><b>6. CUSTOMER CONSTRAINTS</b> <span>CC</span></p> <p>What constraints prevent your customers from taking action as best their interests of customers? i.e. spending power, budget, no cash, network connection, available devices</p> <p>Avoidable medical errors. Low treatable mortality rates. Lack of transparency. Difficulty finding a good doctor. High maintenance costs. The lack of insurance coverage. The shortage of nurses and doctors. A different perspective on solving the shortage crisis.</p>	<p><b>5. AVAILABLE SOLUTIONS</b> <span>AS</span></p> <p>Which solutions are available to the customers when they face the problem? It need to get the job done? What have they used in the past? What price &amp; how do these solutions look? i.e. pen and paper is an alternative to digital monitoring</p> <p>Higher taxes on alcohol and tobacco. Improve fitness standards. Improve research. Transnational support. Reduction in consumption. Recycle and reuse. Reduce corruptive actions. Promote vaccinations.</p> <p>Explore AS, differentiate</p>
<p><b>3. TRIGGERS</b> <span>TR</span></p> <p>What triggers customers to act? i.e. seeing their neighbor installing solar panels, reading about a more efficient solution in the news</p> <p>The most common triggers were unscheduled contact with physician or nurse moderate/severe pain, moderate/severe worry, anxiety, suffering, existential pain and/or psychological pain</p> <p>Define CS, fit into CL</p>	<p><b>10. YOUR SOLUTION</b> <span>SL</span></p> <p>What kind of solution suits Customer scenario the best? Adapt your solution to fit Customer behavior, use Triggers, Channels &amp; Emotions for marketing and communication</p> <p>Hand Hygiene Checklist Avoid abbreviations. Rapid Response System. Promote reporting/Enforce strict disinfection protocols. Use superior tracking equipment. Verify all scientific procedures. Observe care in dealing with medicines. Review staffing policies. Work with depended on providers</p>	<p><b>8.1 ONLINE CHANNELS</b> <span>CH</span></p> <p>What kind of actions do customers take online? Extract online channels from how #7 Behaviour</p> <p>Patients will be a part of virtual communities, participate in research, receive money or ethical support, set goals, and track personal progress.</p>

Problem-Solution fit canvas is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 Intl License

## **4. REQUIREMENT ANALYSIS:**

### **4.1 Functional Requirement:**

Following are the functional requirements of the proposed solution.

<b>IR No.</b>	<b>Functional Requirement (Epic)</b>	<b>Sub Requirement (Story / Sub-Task)</b>
FR-1	User Signup	Signup through Form Signup throughGmail
FR-2	Credential Confirmation	Confirmation via Email Confirmation viaOTP
FR-3	User Login	Login through Form
FR-4	Forgot password	OTP via email
FR-5	Data collection	The majority of hospitals in the United States today have electronic health records, which are the focus of hospital data analytics. A comprehensive record that contains all relevant information about the patient's health is known as a digital health record.



## 4.2 Non-Functional requirements

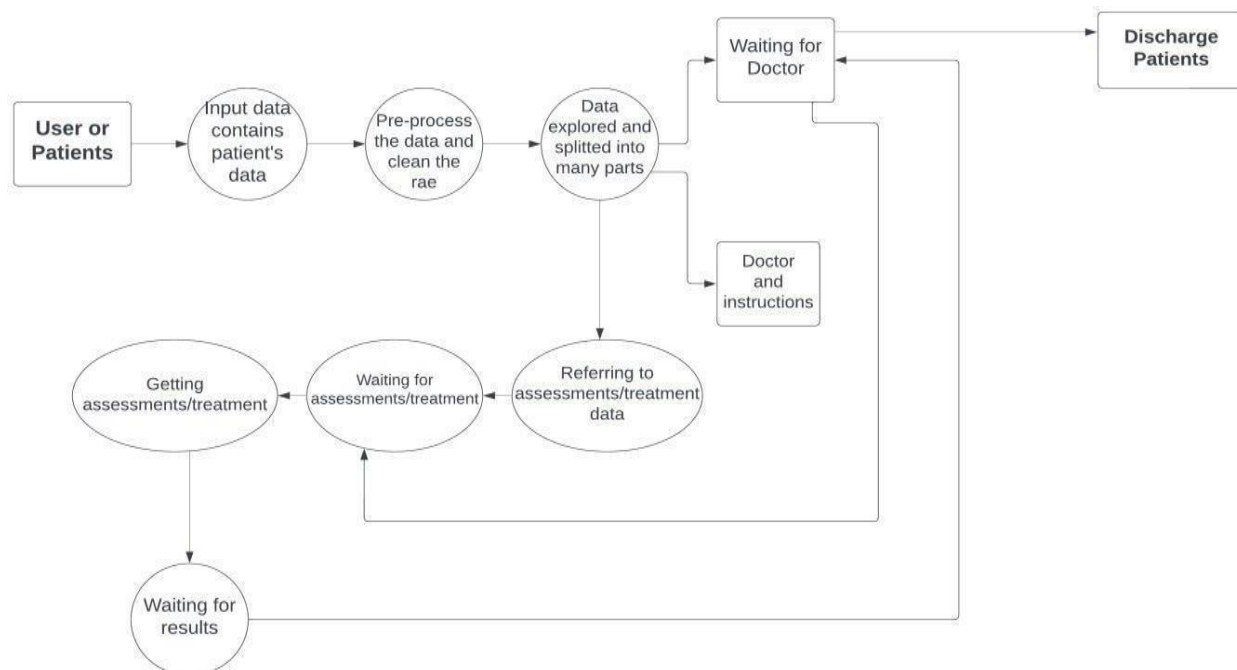
Following are the non-functional requirements of the proposed solution.

IR No.	Non-functional Requirement	Description
NFR-1	Reliability	A random sample of 10% of the medical records was examined independently by two reviewers to ascertain inter-rater reliability. We applied a straightforward computer-based random sample technique to choose these medical records.
NFR-2	Maintainability	Based on four layers, the Maintainability Information Database (MID) is organized. The database has all the project data pertaining to maintenance planning, and this data is integrated with the BIM models of the project for improved project aspect integration.
NFR-3	Performance	People value their health more than the majority of other products and services. Both governments and people spend a lot of money on healthcare. People want to choose their healthcare with knowledge.

## **5.PROJECT DESIGN:**

### **5.1 Data flow Diagrams**

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data centers and leaves the system, what changes the information, and where data is stored.



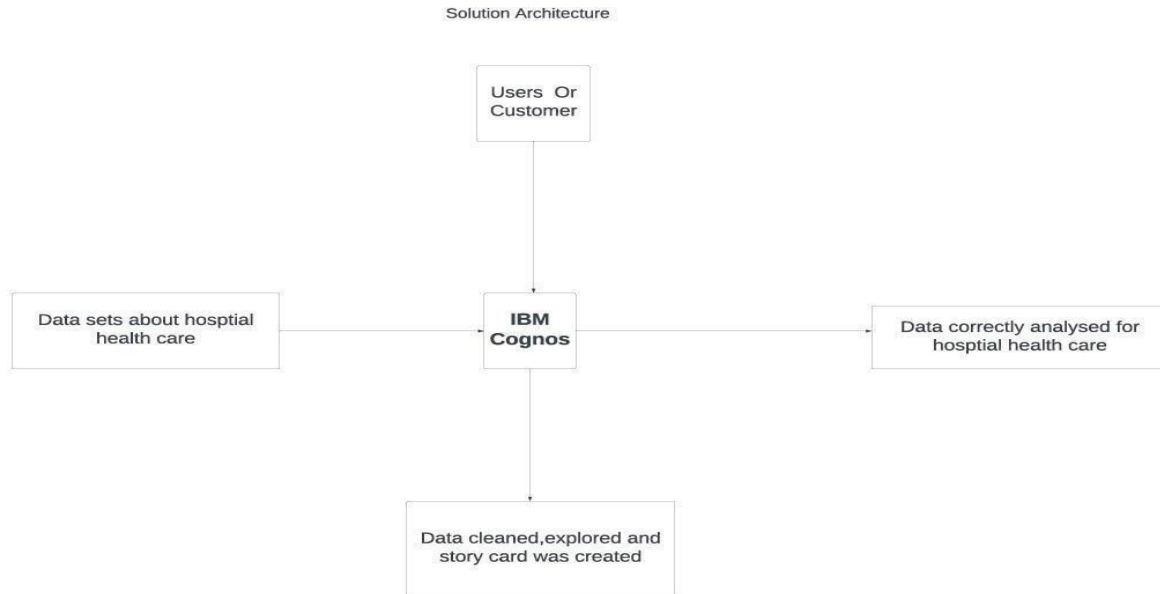
### **5.2 Solution & Technical Architecture:**

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined,

managed, and delivered.

### Solution Architecture Diagram:



### 5.3 Technology Stack (Architecture & Stack)

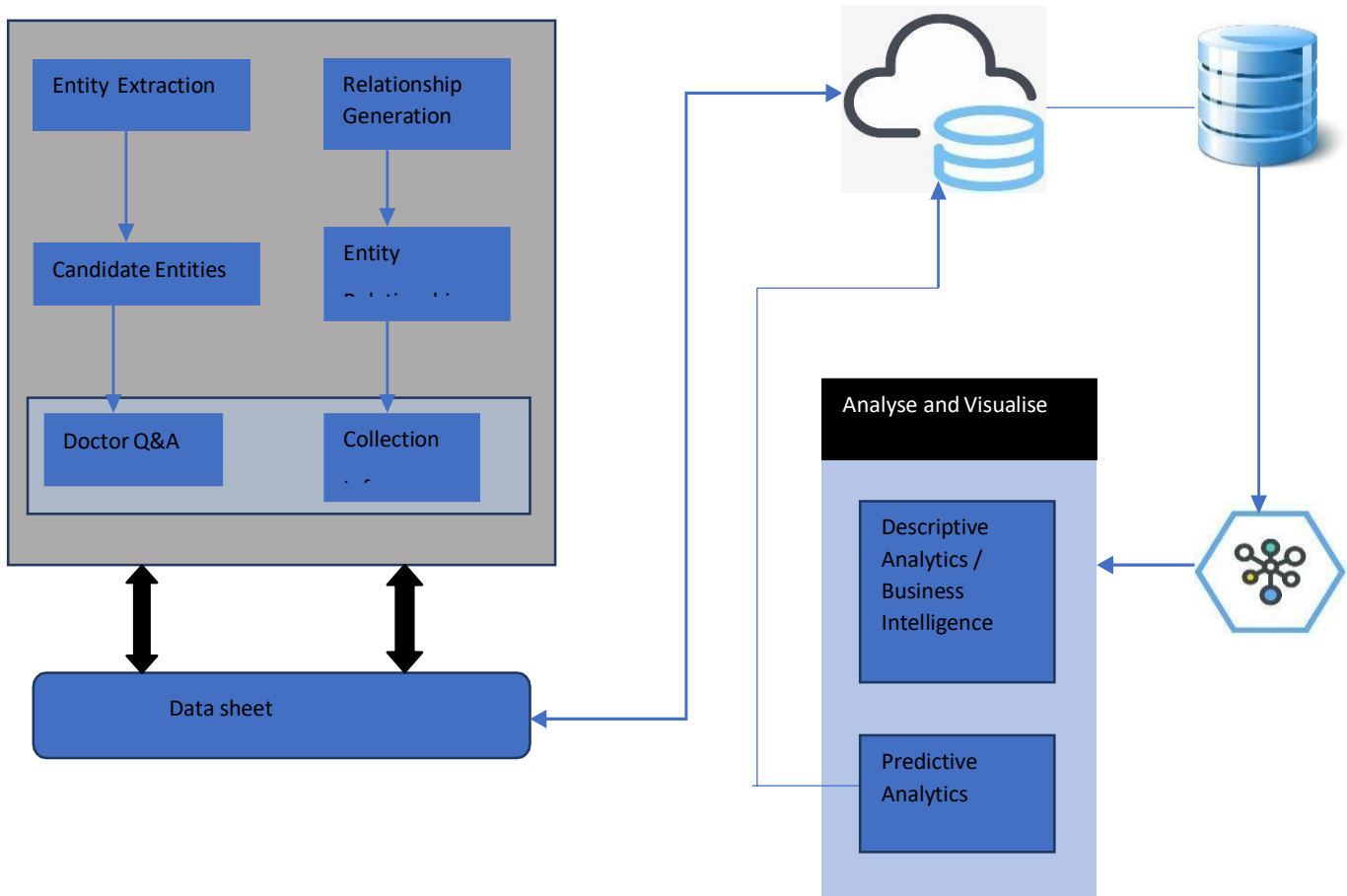


Table 1: Components and Technologies

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S.No	Components	Description	Technology
1	Data Source	The User data which is collected in the hospital will be stored in the data sheet	Microsoft Excel
2	Application Logic	The data which is collected in the hospital is stored in the cloud and it is stored in the cloud for analysis	IBM Cognos , python
3	Database	Data to be segregated and secured in the IBM CLOUD	IBM Cloud

Table 2: Application Characteristics:

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S.No	Characteristics	Description	Technology
1	Predictive Analytics	The data which is collected and stored in the cloud will be used for the predictive analysis of diseases.	Data Analytics
2	Availability	The analyzed data will be available in the cloud, we can access at any time	IBM Cloud
3	Prescriptive Analysis	By examine the collected data, determine an optimal course of action	Data Analytics

## **6.PROJECT PLANNING AND SCHEDULING:**

Use the below template to create product backlog and sprint schedule

<b>Sprint</b>	<b>Functional Requirement (Epic)</b>	<b>User Story Number</b>	<b>User Story /Task</b>	<b>Story Points</b>	<b>Priority</b>	<b>Team Members</b>
Sprint-1	Registration	USN-1	A usercan register for the application through email and password	10	Low	Abhishek P, Arunagiri M, Aswin Suriya S, Daves Pritvii A S
	Data Uploading	USN-2	A user can upload the patient data into the IBM COGNOS Analytics	10	Medium	Abhishek P, Arunagiri M, Aswin Suriya S, Daves Pritvii A S
Sprint-2	Data Visualization	USN-3	A user can visualize the data with various tools	5	High	Abhishek P, Arunagiri M, Aswin Suriya S, Daves Pritvii A S
	Dashboard	USN-4	A user can create a interactive dashboard from the data	10	High	Abhishek P, Arunagiri M, Aswin Suriya S, Daves Pritvii A S
Sprint-3	Data Analysis	USN-5	A user can apply different columns on the dataset for predicting	20	Medium	Abhishek P, Arunagiri M, Aswin Suriya S, Daves Pritvii A S
Sprint-4	Report	USN-6	A user can make a report from the analysis and dashboards	20	High	Abhishek P, Arunagiri M, Aswin Suriya S, Daves Pritvii A S

## Project Tracker, Velocity & Burndown Chart:

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	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

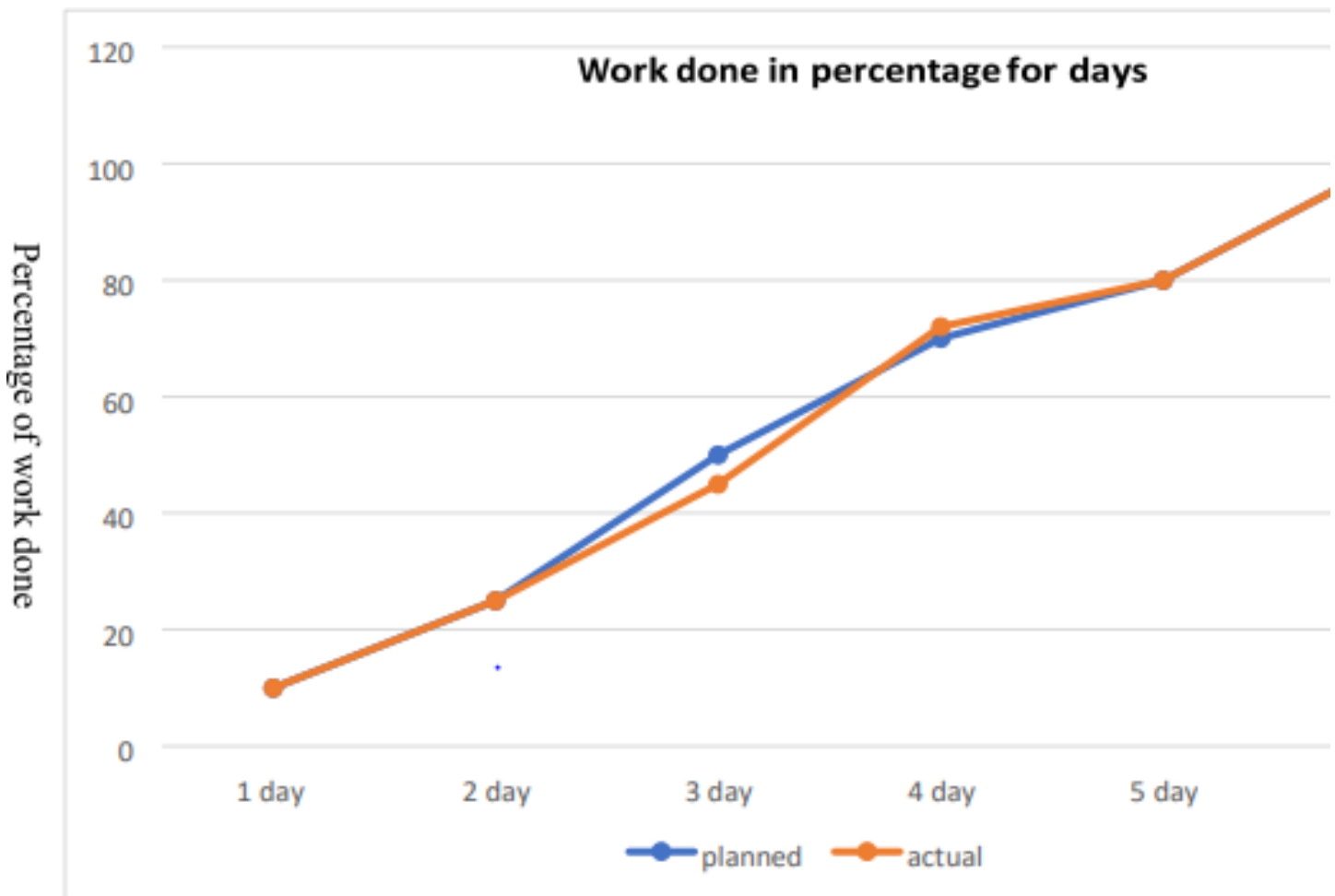
### Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

### Burndown Chart

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.



## **7.ADVANTAGES AND DISADVANTAGES:**

### **Advantages:**

- User can search for doctor's help at any point of time.
- User can talk about their heart disease and get instant diagnosis.

- Doctors get more clients online.
- Very useful in case of emergency

### **Disadvantages:**

- This would be the primary usage of predictive analytics in healthcare diagnosing and treating a disease before it causes larger problems.
- As this new industry matures, the disadvantages are likely to be outweighed by the advantages, presenting a new standard for care Risk related to alteration of data that may be used to make wrong healthcare decisions

### **8.CONCLUSION:**

In the modern days, we must maintain the daily activities of the hospital records, in order to avoid the major risk. This kind of project will help to track and maintain the records, monitor daily activities, patient details etc.

In conclusion, the barriers to healthcare access are not only moral, but they can be financial, or based on policies as well. While it may be easy to say that everyone should have the right to free healthcare, the situation is not that simple.



## **9.FUTURE SCOPE**

Each new wave of technological innovation has produced an exponential growth of data volume for health care organizations. Increase in data volume has led to an increase in the need to capture and process it. Along with the lack of a streamlined process, consolidation within the health care industry has exacerbated access and availability problems. Government compliance and coding requirements have contributed to make this a “perfect storm” for analytics in the health care industry.

Furthermore, organizations view problems around widespread implementation and adoption as insurmountable obstacles. Fortunately, industry stakeholders are starting to see solutions and advancements that may produce a sea-change

**THANK YOU**

Developed by,

Arunagiri M

Abhishek P

Aswin Suriya S

Daves Pritvii A S