INTERNATIONAL JOURNAL
FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Automated Healthcare Informatics on Service Management

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Abstract: This paper explains new technological advancements in the field of hospital management. It illustrates effectiveness in an information and communication technology (ICT) and web technology (WT) domain, which attempts to merge healthcare and technology. It deals with end to end automation in healthcare services provided by the hospital. Health care automation being a revolutionary technology, lets you automate all the functional and non-functional elements of the hospital in service management. This system uses tableau and Pentaho tool for developing dashboards which help to eliminate the need of paper-based visualization and help the Health care business users to effectively analyze and monitor the daily takes that are performed in the Health care. Basically, we use the data mining and business intelligence techniques and methods to provide the stakeholders with detailed inspection of the Health care workings. Pentaho is a tool that provides business intelligence and OLAP services, reporting, Data mining and ETL Capabilities. Using this we extract only the data needed for analysis from the huge data sets. Thus, this system makes the work easier
Keywords: End-to-End Automation, Service Management, Tableau, Dashboards, Key Performance Indicators.

I. INTRODUCTION

Health care is the essential part of our lives, providing best medical facilities to people suffering from various ailments, which may be due to change in climatic conditions, increased work-load, emotional trauma stress etc. It is necessary for the Health care industry to keep track of its daily activities & History of its patients, doctors, nurses, ward boys and other staff personals that keep the Health care running smoothly & successfully. But keeping track of all the activities and their history on paper is very strenuous and error prone. It also is very inefficient and a time-consuming process. Observing the continuous increase in population and number of people visiting the Health care, Recording and maintaining all these records is highly unreliable, inefficient and error-prone. It is also not economically & technically feasible to maintain these records on paper. Thus, this paper depicts how end to end automation will affect the Health Sectors and how it can be implemented.

We are using a tableau tool for developing dashboards which help to eliminate the need of paper based visualization and help the Health care business users to effectively analyse and monitor the daily takes that are performed in the Health care. Basically we use the data mining and business intelligence techniques and methods to provide the stakeholders with detailed inspection of the Health care workings. Also, we use a tool called Pentaho that provides business intelligence and OLAP services, reporting, Data mining and ETL Capabilities. Using this we extract only the data needed for analysis from the huge data sets.

In the future, this systems can be extended to give more detailed analysis of the Health Care industry and solve problems such as maintaining manual record of data, studying the data manually and can help to save a lot to time. Also, it can be used to predict the outcomes and suggest measures that can be taken to prevent an error and significantly it will help to reduce labour costs.

II. TABLEAU

Tableau is a tool that helps to understand and analyse data. Users can generate and dispense an interactive and shareable dashboard, which illustrate the trends, variations, and density of the data in the form of graphs and charts. Tableau can bind to files, relational and Big Data sources to acquire and process data. The software allows data blending and real-time combination, which makes it very eccentric. It is used by businesses, academic researchers, and many government organizations for visual data survey.

In this research we have used Tableau as the core software for visualization. With the help of Tableau we have created dashboards that can be used by business people to analyse the service management parameters such as billing, bed occupancy rate (BOR), average length of stay (ALOS), etc. To create these dashboards we fetch data into Tableau from the Data marts of the hospital using the ETL (Extract- Transform- Load) process. This data is updated every day thus, is accurate and draws perfect visualization.

III. GOOGLE SHEETS AND SITES.

Google Sites is a structured wiki- and Web page-creation tool offered by Google. The goal of Google Sites is for anyone to be able to create simple web sites that support collaboration between different editors. We use Google sites to implement the intranet portal. The advantage of using Google sites is that it provides privacy, easy to use tools and, easy ways to edit and maintain the website/Portal.

Google Sheets makes our data pop with colorful charts and graphs. Built-in formulas, pivot tables and conditional formatting options save time and simplify common spreadsheet tasks. The advantage of using Google sheets for storing the data is that it can be accessed from anywhere and it is a free service.

IV. DATA MINING AND ANALYTICS

Data mining is the process of sorting through large data sets to identify patterns and establish relationships to solve problems through data analysis. Data mining tools allow enterprises to predict future trends. In this paper we use the concept of Data mining to visualize the trends in Health Care using tools like Tableau and pentaho. We use the large sets of data available in the Hospital server to perform this process.

Analytics is used to make conclusions with the help of tools like Tableau. It helps the Business people to get insights about the system.
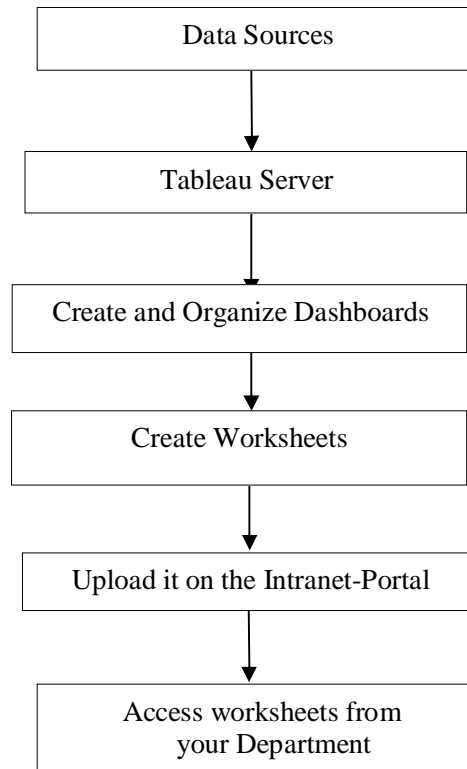
V. LITERATURE SURVEY

A. (Fei Wang; Gregor Stiglic) are focusing on basic and translational research to achieve this goal. They have adopted Electronic Health Records (EHR) which opens additional opportunities for data analytics, as structured and unstructured data that is systematically collected for each event in the healthcare system or even contributed by the patients themselves. This paper covers different techniques for data analytics and their translational value in improving the quality of healthcare. People will gain a better understanding of risk estimation and stratification, patient similarity, privacy-preserving predictive modelling and patient-based classification.

B. A conceptual method is used, where Technology Acceptance Model for healthcare technology is been accepted. This research contribution supports to identify new insights on the effects of trust on the 'intention to use' of healthcare technology. This paper basically inspires us to adopt new technology for data analytics in healthcare informatics which will basically reduce the work of people who have to do all business related decisions based on the new technology.

C. It proposes to serve as a facilitator for an application of Information filtering and retrieval in Medical `Informatics. This basically helps to retrieve information and filter it according to the needs of the hour. It is user centric which basically is for users i.e. user centric. It provides solution to all related to the medical field which involves doctors, stakeholders, patients, suppliers, and salesperson.

D. This paper is basically the study that is focused on understanding the performance indicators of Hospital information systems (HIS), summarizing the latest commonly agreed standards and protocols like Health Level Seven (HL7) standards for mutual message exc hange, and HIS components. It defines the need of E-hospital management systems and also provides so of its solutions.

VI. GAP IDENTIFICATION

Sr no.	Research gaps	Solution
1	Professionals find it difficult to identify and understand the key performance indicators and visualize the data of the hospital[4]	Tools like tableau and pentaho should be used for data visualization of hospital.
2	All thrive to provide solution to the given problem but none of them provides us with a robust and effective system for automation	A system which provides end to end automation to all the given modules of hospital management should be developed

VII. PROPOSED WORK

We have implemented end to end automation with the help of Tableau and the dashboards created using tableau are put in an intranet portal created on Google sites. One specific reason for using Google sites is the security and privacy. Every user or Department will have to login using a Google account to access their departments page thus, providing the best of security and privacy.

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┌─────────────────────────────┐
│        Data Sources         │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│       Tableau Server        │
└─────────────────────────────┘
              │
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┌─────────────────────────────┐
│ Create and Organize         │
│ Dashboards                  │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│      Create Worksheets      │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Upload it on the Intranet-  │
│ Portal                      │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│  Access worksheets from     │
│     your Department         │
└─────────────────────────────┘
```

Working

1) Load the data into Tableau server from Hospital Data marts.

2) Using the Data create dashboards according to the specified Key Performance Indicator.

3) Create a worksheet which contains interlinking dashboards to make a comprehensive analysis.

4) Upload the worksheets on the Intranet portal to make it available to business users.

5) Access the worksheets using for Department and analyse the results which are visualized automatically using daily updated data.
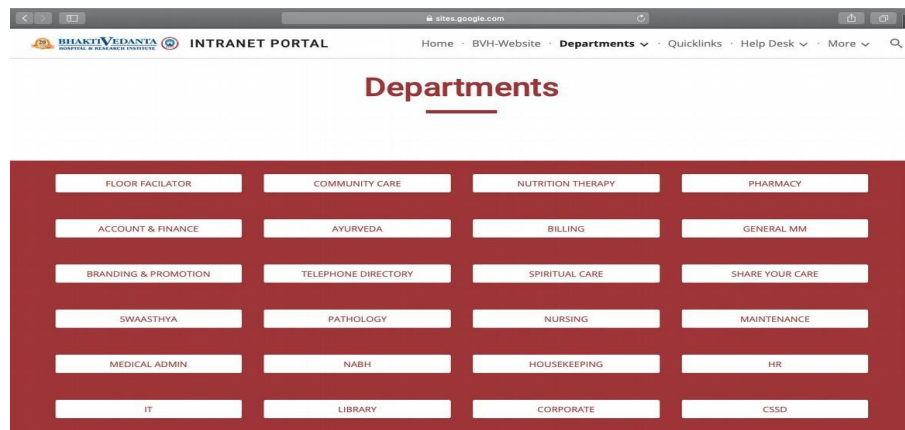
VIII. RESULTS

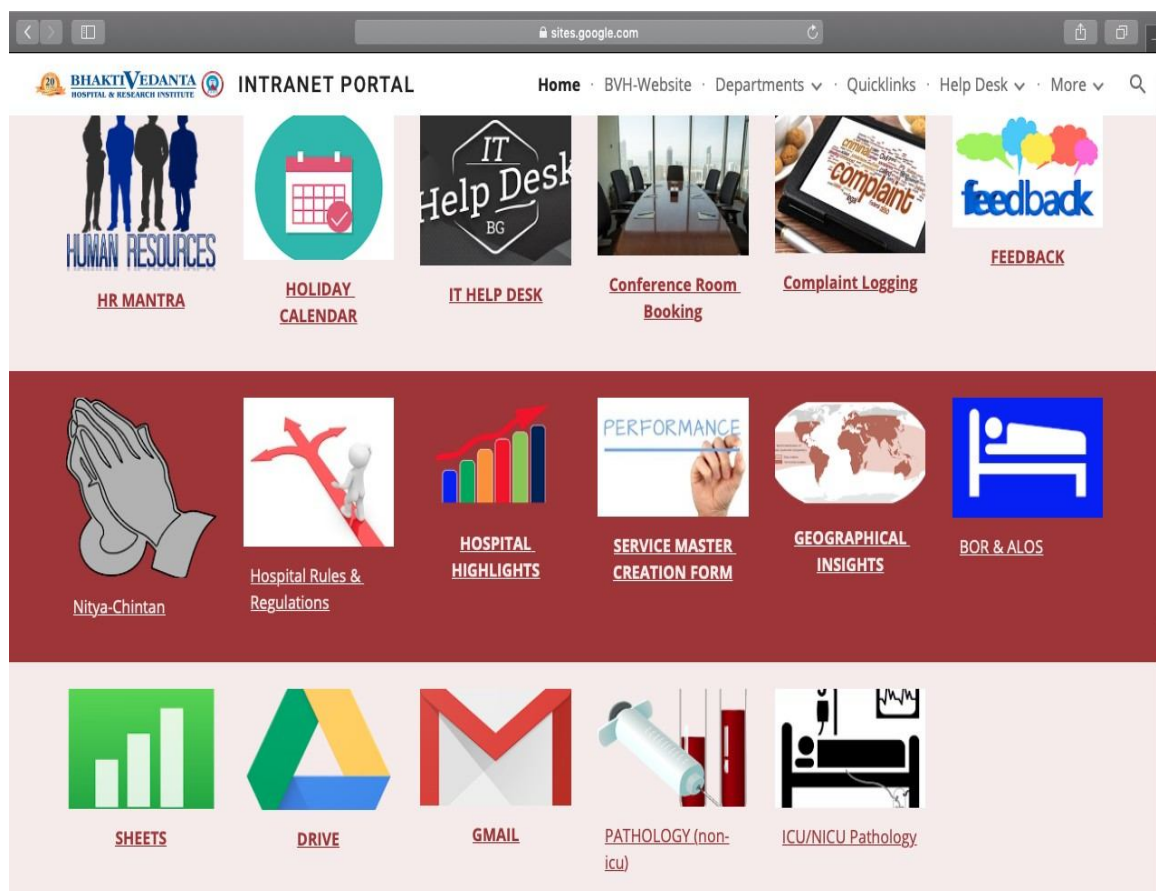Fig2. These are the Departments in the Hospital

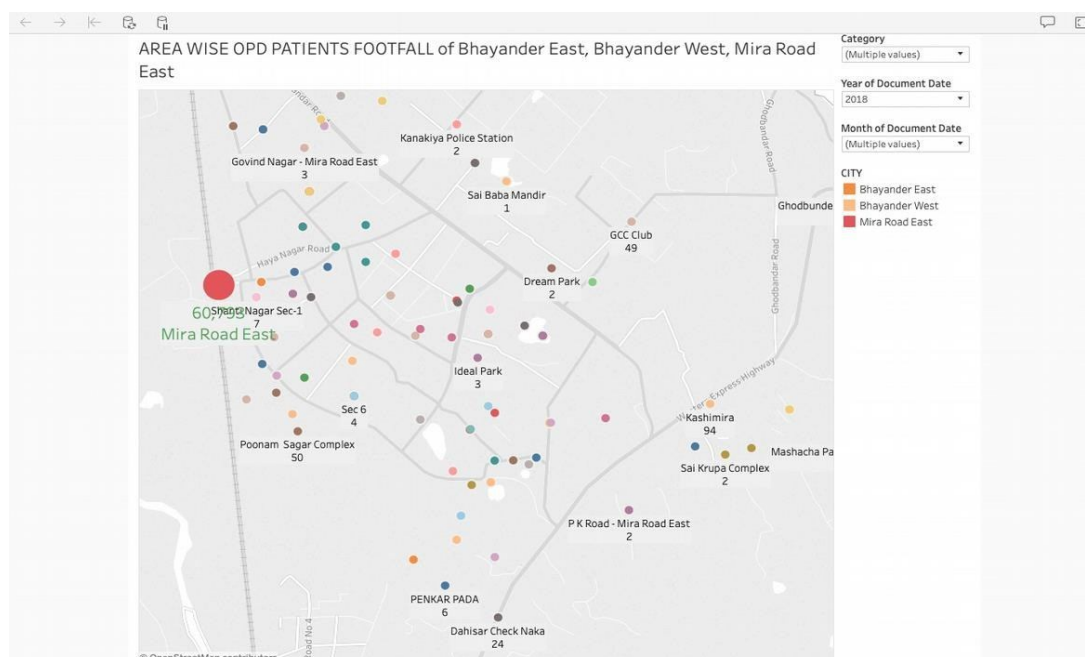Fig3. This is the main page of the Intranet Portal

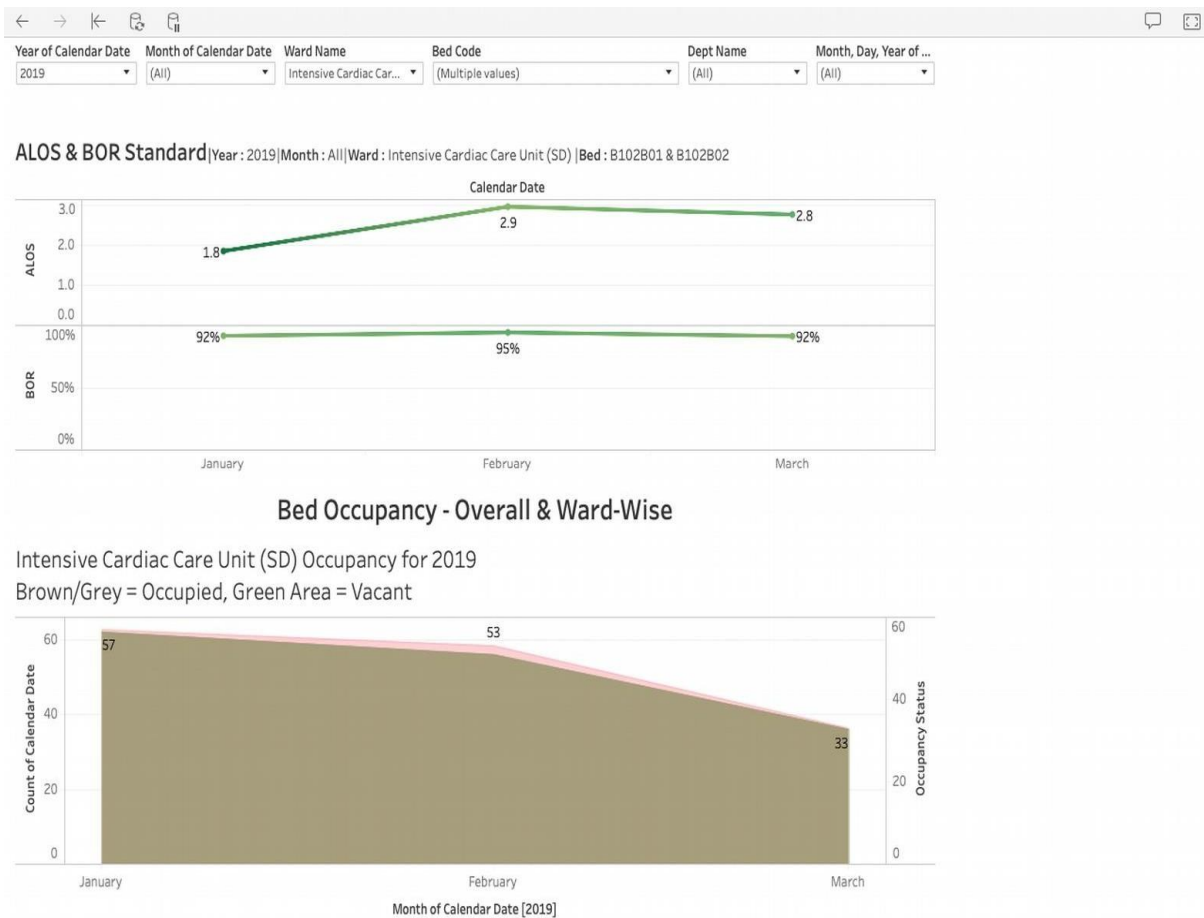Fig4. This is a Dashboard that gives the insight of important locations from where the patients are.

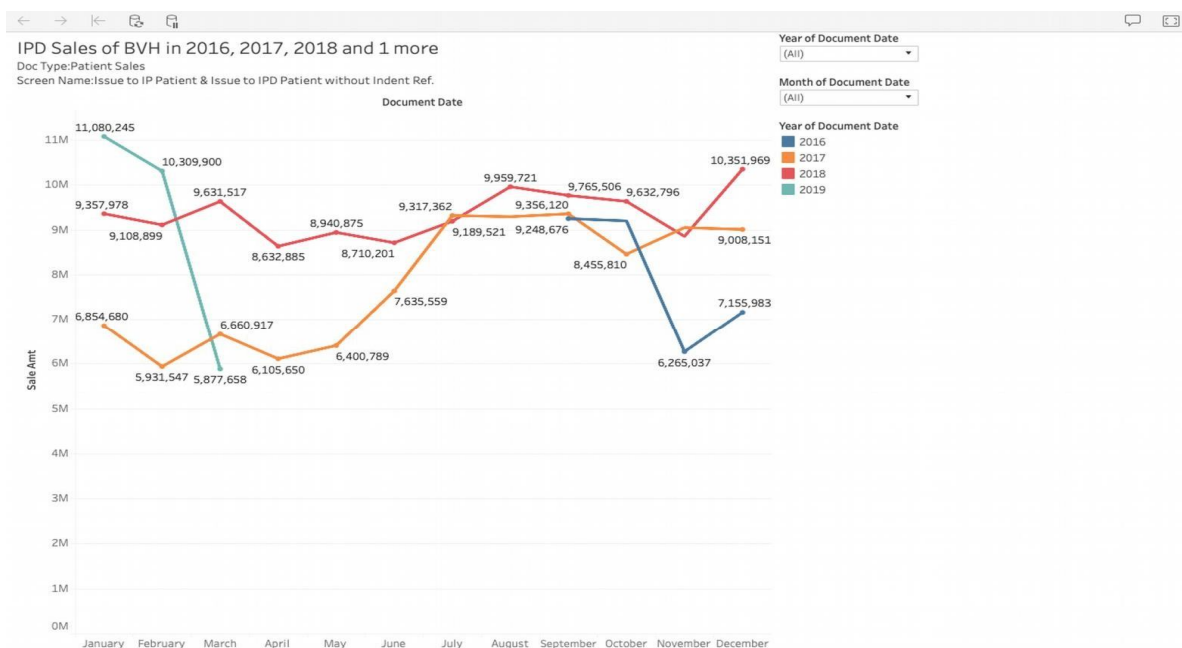Fig5. This worksheet shows the Average Length of Stay and Bed Occupancy Rate

Fig6. This graph shows the IDP sales for various years.

IX. CONCLUSION

There are only a few hospitals that have adapted to automation for the office works. Compliance is a fundamental component of running a healthcare facility, in any hospital. Those working within these facilities do not have the time to go through the hospital and patients records; trying to show proof of compliance. Automation tools thus give the doctors and staff members to focus on the health of patients rather than going through a lot of paper work. These automated systems are thus beneficial to the medical professionals as it eases lot of their work. This system integrates with the hospitals old system and database and creates reports for analysing that data. Such advancements in the healthcare industry will take the industry by storm as it has more benefits than their own legacy systems. The system which we used was only limited to the service management sector of the hospital the same can be developed for the material management sector as it will help ease the professionals from that sector. It can be used to predict the outcomes and suggest measures that can be taken to prevent an error and significantly it will help to reduce labour costs.

X. ACKNOWLEDGMENT

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