FEASIBILITY STUDY

Date: 16.02.2015

ONLINE HOSPITAL MANAGEMENT SYSTEM

TEAM NAME: TEAM 7 **SECTION:** A

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REVISION HISTORY

Revision #	Date	Author	Change	Approved by
1	3.3.15	Team 7	Keerthana B (As per guidelines mentioned by Team 2)	

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1. EXECUTIVE SUMMARY

The entire working of any hospital system is very hectic and sophisticated. But it should be managed with utmost care to make the working of hospital streamlined, as well as avoid unnecessary trouble to the patients.

Our project will provide an interactive environment which will automate the working of hospital, giving dynamic schedules to doctors, nurses and managing the allocation /reallocation of hospital resources to patients. Patient will also complete most of the tasks through our website, and needs to go hospital just for consultation of doctors/check- ups.

2. CURRENT SYSTEMS AND PROCESSES

In today's world, hospitals are filled with the hustle and bustle of doctor, patients, nurses and other management staff. Ambulances are constantly servicing emergency in-patients and out-patients. But during the time of a calamity(such as a natural disaster or an epidemic breakout) ,management of the resources such as hospital beds ,prioritizing patients ,scheduling ambulances ,dispatching medicines, assigning and notifying doctors efficiently becomes extremely crucial and vital for the efficient operation of the hospital and to save the life of patients.

2.1 Current Operations

The current scenario is that most of the hospital operations are done manually, scheduling doctor appointments, managing operation theatres to delivering the lab test results and coordinating activities in the emergency ward.

There are a few components which are automated like the billing module. Paying the doctor fee, operation theatre, room charges, in house dietary charge are all fed to the system and bills are generated for each patient. Even the allotment of rooms for the patients is recorded to keep a regular check on them and supply their dietary requirements.

2.2Physical Environment

The physical environment being used for the existing system:

Hardware components:

1. Central processing unit, input and output devices, electronic storage devices, and the network support systems.
2. CPUs include mainframe computers, mini computers, and personal computers. Input devices include non-intelligent terminals, intelligent terminals, keyboards . Output devices include printers and terminals.
3. Other equipment used in hospitals are CT scanners, MRI, Echo scans, Ultrasound ,X Ray and ECG scanning machines.

Software components:

1. Database to manage all the patient records for allocation of rooms.
2. HR module and billing modules.

2.3User Organization

Hospitals themselves use these modules to manage their working. Patients are efficiently scheduled with very quick response time. The users of these systems, such as the billing staff, find it extremely easy to track the costs of all the patients and keep adding additional services to their individual tabs as and when required. Nurses can diligently deliver all the patients requirements to their allocated rooms at the right time.

3. SYSTEM OBJECTIVE

This is a product for making hospital management automated and easy to handle. This is a web portal which incorporates following modules.

- Home page: It incorporates the details of the hospitals in terms of Ward Facility, Physiotherapy, Laboratory Services, Pharmacy, X-Ray Facility, Ambulance Services, ECG Services, Emergency Beds, Food Services, Guest Dining Hall, Security, Department/Branches, and Doctor/Nurse.

- Patient: She/he can basically login in to the page check for appointment, it can be done by finding doctor of his/her choice or by searching via departments available in the hospital. Apart from that patient can also check his history of checkups, operations, vaccination schedule and transactions (if any). Patient can also change password and update his information.

- Doctor: Doctor can check patient details which will include his information plus his history (if any) which will assist him in writing prescriptions which is also one of the functionalities incorporated in the doctor's dashboard. Website also generates their daily schedules dynamically according to their work load and patient requirements.

- Laboratory: It gives the details of the test available in the hospital along with their cost. Doctor has a provision to prescribe any test from his test which will reflected here and lab head can assign the time slot to the patient which will be informed to both doctor and patient and it will also generate the cost of all test which will be added to final bill.

- Admin: Admin has all powers and access to hospital database. It can add doctors, take care of billing, maintains about us page, maintaining blog, access to information of doctor and patient adding departments and enabling login as doctor and staff.

- Nursing: This module helps the patient in seeing details of the beds available so that he/she can choose bed of his/her choice. Nurses and ward boys can check their shift details and what beds they have been appointed to.

- Pharmacy: Whatever medicine which is prescribed by doctor will be reflected on pharmacist dashboard. Pharmacist can issue medicine according to prescription and generates the bill which will be added to the final bill. It also incorporates returning of drugs if it is not expired. Plus it also takes care of the hospital's medical store like list of medicine, Report on stock valuation, movement of stock etc.

- Human Resource: This module takes care of the employees in hospital. It tracks the no of employee in each department generates vacancy if needed and verifies and appoints the applicants.

- Security: Security is the key aspect of our product which makes user feel free to feed their sensitive data in our database. We have incorporated various security like Protection

against rainbow tables, lookup tables and reverse lookup tables. Protection against SQL injection, Protection against brute force attacks and several and various others.

3.2Targeted Customers and Benefits

Our hospital management system will target all age groups from children to old aged people. We are also handling special situations as in the case of a natural disaster or calamity. (Emergency routines)

The advantage of this application:

1. It is an automated hospital management system and hence it reduces human effort and chances of errors.
2. Patients don't have to stand in a long queue as they can do their registration and come at the allotted time.
3. Provides a well-designed admin interface to manage the overall working of the hospital.
4. Doctors can see their schedule generated automatically by viewing the portal and can sync their work accordingly.

3.3 Technology Considerations

For this application we need a GUI which is user friendly and efficient.

We are planning to implement the GUI with the help of HTML5, CSS and JavaScript. For the backend, we are planning to store data using MYSQL. Relationships between the various tables will be established which will help in efficient query writing and retrieval of data for various modules. This centralized database will be stored on a server which will service the requests of the various desktop clients.

Integration of our GUI with the backend Database would be done using PhP.

4. PRODUCT/SERVICE MARKETPLACE

The targeted customers are patients, potential patients, doctors and hospital office staff.

Competition: Although there are several competitors like KRONOS, APOLLO etc., we plan to implement a similar system with several additional features which allow the patients to choose their preferred room depending on the vacancies available through the online portal. They will be presented with a list of all available rooms of a particular type and as when they book a room, the database will be automatically updated.

The patients (Both IN and OUT) will be provided with a simple interface to connect to the hospital, view relevant doctors and their shift timings, schedule an appointment for their next visitation etc. This will make the operation of the hospital much more simple, fast and cost effective.

This project will have an impact on the clients (hospital) and the public (patients) that will result in the hospital's recognition as an innovator or leader in the field and in turn result in better business.

5. MARKETING STRATEGY

Digital Marketing strategies to acquire new patients

The key to acquiring new patients digitally is simply making sure the organization and its information is easily accessible for those who need it quickest: physicians, patients and staff. Harness the strengths of technology to ensure that the brand is discoverable online and has powerful, user-friendly tools.

1. Engaging Consumers with Wellness

   Health and wellness messaging is a powerful way to build a hospital brand and differentiate our organization. We can organize a successful campaign that engages consumers directly to promote healthy habits and fitness tips. For example, by featuring a local sports celebrity and an online, interactive tool.

2. Search Engine Optimization:

   The Marketing can be primarily accomplished through search engine optimization, which involves using keywords in online communications that correlate with various patient needs, but also involves making sure that online content is relevant and dynamic.

3. Maximizing Website Experience:

   Once the potential consumer lands on our website, they must be able to easily find the information they need, like -How is the user experience? This is where we can supplement high-priority information with a specific call-to-action that can drive immediate decision making for current or potential patients. Adding a toolbar like this will ease navigation and land our visitors to the page they want, and quickly. Topics for this section can include "Find a Physician," online chat, bill pay, location information and general "Contact us" information.

4. Increased Patient Education:

As patients realize they have more options, they also know that they need more information to make those choices and are looking for professionals who are willing to provide education. Hospital websites can include blogs, videos and a host of other information on topics ranging from child care to geriatric lifestyles.

5. Include referral phone number and other key info on all pages:

We wish to include these information on every page. This can be in a footer, a side bar, or even better, in the banner of the website, right in plain sight. Routing our patient to the proper point of communication can turn out to be a valuable first impression. With the right tools and resources in place, tracking and monitoring inbound phone calls can tie hospital revenue directly back to the patient who visited our website.

6. Social Media Engagement:

We can develop communications plans for those younger individuals who are now qualifying for healthcare coverage. This group can become lifetime consumers if they are engaged early through channels that are appropriate to them. This demographic relies heavily on social media to drive its decision-making. Hospitals that use various online channels to engage and educate the younger audience can drive increased traffic to the website.

6. ORGANIZATION AND STAFFING

Our system will definitely be a great, effective and easy way to manage and organize almost all hospital activities automatically. But since computers have lots of memory but no imagination, We do need an operator to look after it. Hence, the hospital will need new staff position but very few as most of them can be done by current staff scenario itself.

The changes in staff positions will be:-

1. Receptionist: (2-3)

This post requires any person with sound knowledge of computer, so that he/she can operate it. It will be their task to make any dynamic changes if required. They will inform the system about the patients visited and their related information.

2. Manager:

He should also have sound knowledge of computer to understand various issues, if present.

3. Check-up data uploader:

It will his/her responsibility to upload all the related data about the test results and check-ups results on our system.

4. Software expert:
To fulfill any technical requirements, that may be needed by the hospital.

7. SCHEDULE

We are expecting to complete this project by April. It's a 4 month project. The following is a very high-level schedule of some very significant milestones:-

DATE	**MILESTONE**
Jan 25, 2015	Initiate Project
February 15, 2015	Project kickoff meeting
February 28,2015	Complete database creation and populating with test values for verification of modules.(This will include completion of a majority of the queries for the front end modules)
March 15, 2015	Linking of front-end GUI and back-end (Integration)
March 30,2015	Testing of site and network issues
April 15, 20 15	Final testing
April 20,2015	Final Demonstration

8. FINANCIAL PROJECTIONS

Assumptions:

1. All milestones are performed in accordance with the schedule.
2. All transactions are closed yearly with no carry over to subsequent years.

The cost to conduct a full system investigation.
The cost of hardware: We need 2 servers
1. Always up and running
2. Backup.

The cost of software development:
Backend – Creating a database using PHPMyAdmin.
Frontend – Website using HTML, JavaScript.

The developers are paid to design a hospital management system so there will be some costs incurred for software development as well.
The proposed system needs to update to include upcoming new facilities, as a result the performance is improved which in turn may be expected to provide increased cost.

Staffing Requirements:
Receptionist: 2-3
Manager
Data Uploader
Software Expert (Contract support for IT and Training)

9. ISSUES

- Providing security for the database, in terms of – confidentiality, data integrity and authentication of users. But this can be achieved by encrypting the critical data which is stored in the database. For e.g. Passwords and Login IDs.

  As our project is intended to be an online system, security for our project is related to protection against common web based attacks.

  1. All user accounts(doctor/admin/patient) are secured through a password protected login system and passwords are stored by first hashing them using sha-256 hash algorithm and randomizing them by appending or prepending a random string, called a salt generated using a Cryptographically Secure Pseudo-Random Number Generator (CSPRNG), to the password before hashing. As hash algorithms are one way functions and randomizing the hash using salt makes it secure against all types of attack

(rainbow table, lookup table) used to crack plain password hashes, Even if someone gets access to our database they cannot figure out the passwords and compromise user accounts.

2. Use of parameterized queries to prevent SQL injection. Doing this allows the server to create an execution plan for the query, which prevents any "injected" SQL from being executed thus protecting the database from unwanted intrusion.

3. Enforcing use of strong passwords and use of captcha to require the user to enter a word (from the image) or solve a simple math problem to ensure the user is in fact a person protecting against brute force attacks to gain access to user accounts.

4. Use of SSL protocol to provide secure communication medium between the website and web server or database to protect against attackers who could sniff for information to gain access to user accounts and personal data.

- Handling concurrent access to database.

- No verification of the information being stored in database i.e. User's Data should be authentic. It should not be tampered with. This is taken care by the security measures we are planning to incorporate.

- As the entire hospital will be on their system, failover and contingency mechanisms will have to be put in place to ensure the hospital can function even without some or whole of the system going down.

- Ensuring the enforcement WHO of protocols such as SOAP

10. ASSUMPTIONS AND CONSTRAINTS

Our proposed automated online hospital management system will work to its best when subjected to the following constraints:

- The entire hospital should be well equipped with internet, then only the dynamic scenario of patients can be sent to the system.
- The checkups and testing laboratory are separate module. Hence, we assume that the data uploader will upload the data as quickly and efficiently as possible.

- The receptionist will make regular updates to the database regarding the patient's information.
- In the case of blind or handicapped people, appointments to meet the doctor can be done by a help desk attendant or by a relative of the patient who can maintain his or her account.

11. ALTERNATIVES

1. Alternative 1: To continue with the current system.

If we go with this alternative, then obviously all the task and management will have to be handled manually. This may be time consuming and cumbersome and records have to be kept diligently and maintained carefully to avoid mix-ups.

2. Alternative 2: To use computer just for database purpose

If we go with this approach, the huge files will be converted to soft copy and can be stored very efficiently. But since, it is not fully automated hence, the receptionist or administrator will have to query database properly before doing any stuffs related to patients.

PROPERTY	ALTERNATIVE 1	ALTERNATIVE 2	OUR APPROACH
Benefits	None	Efficient and easy storage of data records	Everything is automated.
Limitations	Everything has to be handled manually	Even though databases are used to store the patient records, the patient has no UI to manage his appointments or select the type of room he wants to stay in the hospital. No preferences can be specified.	Internet plays an integral part, for the system to work at its best. If there is no connectivity, then doctors cannot check their schedules and appointments which will be updated on the portal.
Cost	It is the cheapest. Investments have to be made only in terms of the records to be maintained manually	A bit more expensive because it requires the maintenance of a database	Initial expenses are a lot, running costs are further reduced.
Risk	More prone to errors	Not as prone to errors	We provide security aspects to take care of any tampering with the centralized database. User information is authenticated and highly confidential.
Dependencies	We are dependent on the person in charge	Dependent on the administrator and the database.	Depends on internet connectivity and power supply. Servers always have to be up and running.

12. FINDINGS AND RECOMMENDATIONS

Based on the above feasibility report, it is highly recommended that this online hospital management project must be initiated, as soon as possible. It will be highly useful for patients, doctors, and hospital staff. The following are the key findings:

1. Summary of issues concerning development and implementation

   We are assuming that the patients or any of his relative knows to operate computer. The patients, doctors and staff must have an internet connection. Wi-Fi should be provided for the entire hospital

   Every hospital big or small can use this system for operating efficiently and cost effectively.

2. Results of research on hardware and software alternatives, technology, marketing, financial etc.

   - Technology aspect

     The front end will be a web site which has an easy to use interface. For backend we are using MYSQL. This will make development easy as well as convenient to use by the patients. ▪ Organization

     No new staff is required, most of them can be trained to use computers at a basic level.1-3 receptionists working in different shifts. Minimal stress to staff, since everything will be automated.

   - Financial

     There will be costs incurred for maintaining all the computer systems within the hospital. Plus there will be annual charges for hosting our servers and websites.

     Additional costs for the service providers to provide an all-round internet connection to keep the transactions going on without much downtime of the website.

     No fake appointments since advance consultation fee for the doctor has to be paid and hence there are less chances of patients changing their mind and doctor's schedules being messed up.

   - Marketing

     Various features like search engine optimization, keeping a record of the patient's health history and including referral key/numbers on each page will help maximize the website experience. In this way, the patients, doctors and hospitals can easily adapt to our system. Engagement with social media in terms of online advertisements will help us to market our product.

- Significant risk factors ○ Security ○ Slow response to user's query as the database expands. ○ Implementations of EMERGENCY-SEWA .

13. PROJECT PLAN

- DELIVERABLES OF THE PROJECT

  The end product will be an automated system, which will have an online website with different interfaces for patient, receptionist, manager and checkups-data-uploader. This system can manage the working of a single multi-specialty hospital or can be customized appropriately (by adding and removing appropriate modules) to manage generic hospitals or small clinics

- PROCESS MODEL WHICH YOU INTEND TO FOLLOW

  The project model that we are intending to follow is the scrum agile model. Daily scrum Meetings are carried out and there is retrospection of our progress in each meeting. Who did what and what were the difficulties that they faced?

- IDENTIFICATION OF UPSTREAM DOWNSTREAM PARTNERS

  Upstream partners include our mentor Prof H.L. Phalachandra and some hospitals from which we obtained a general schema and idea as to how to go about creating our HMS. They provided us with information about the various services/modules which function in a hospital like the labs, patient management, bed allocation, pharmacy etc.
  With this information we have gone about with the creation of our product to meet the requirements of the hospitals based on the problems they face on a day to day basis.

  Downstream partners include our targeted customers i.e. hospitals and online social media.

- RESOURCES NEEDED FOR THE PROJECT

  Our project is fully software oriented hence, not many resources are required

  1. Human resources: our entire team with full dedication
  2. Equipment: laptop, internet, working server at later on stages
  3. Time: we need at least 2 months.
  4. Software resources: MYSQL, Php, HTML.

- HOW ARE YOU ORGANIZING YOUR TEAM IN A PROJECT

  As we are using AGILE method we have decided to split our group into scrum teams. As of now, we have decided the following different modules. 1. Front-end GUI (creating website and adding additional features)

  2. Back-end (Creation of Database and writing queries)

  3. Security management module

- STANDARDS-GUIDELINES-PROCEDURES

  1. The interface should be user-friendly.

  2. Changes are welcome at later development stages also.

  3. Everything should be automated.

  4. The website and interfaces should be fast for all, be it patient, receptionist or data uploader.

  5. We intend to provide documentation along with the coding, so that it can be useful for other team members also.

  6. The transactions should be secure.

- COMMUNICATION MECHANISM

  1. We will be having a weekly meeting every Monday after college, to show our progress to our team. Each scrum team will explain the work they have accomplished over the week.

  2. Apart from weekly meetings we have WhatsApp group and google group for day-today interactions

- RISK

  1. Security issues are the biggest risk to our system.

  2. Slow access time is our next risk which will definitely slower the response time. 3.

  Our system should respond exceptionally well in emergency cases 24 X 7

- QUALITY CRITERIA

1. Availability: The server should response faster for any number of users. Should be available for 99% of the time.

2. Maintainability: It should be easy for the operator (receptionist) to maintain the system. Good uptime and maintenance.

3. Reliability: Above all the system should be reliable and should not contradict real life situations.

- WORK PACKAGES

1. GUI Package: Deals with the user interfaces

2. Database Package: Deals with efficient storage of data but access might not be as fast as in Mongo DB.

3. Security Package: Deals with security issues related user accounts and passwords .Only Admin access is provided for some modules to prevent other staff from modifying the data unintentionally. We have also looked at SQL Injection and how it can be prevented.

4. Linking front-end and back-end: Deals with efficient linking GUI and database packages using PhP.

- BUDGET AND SCHEDULE

There is no huge budget expected. Just cost of human labor .As per now, we have broken our project into following components.

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Serial no.	Work break down
1	PATIENT REGISTRATION
2	REPORTS AND LAB FACILITIES
3	SEARCH PATIENT DETAILS
4	PATIENT MANAGEMENT
5	DOCTOR CONSULATATIONS
6	ADMIN MANAGEMENT
7	NURSING
8	DOCTOR MANAGEMENT
9	FACILITIES AVAILABLE
10	HUMAN RESOURCES
11	DATABASE HANDLING

Modules	Teams
6 , 8, 10, 4	Vinay, Ambuj, Lokesh and Himanshu
11 , 1,2	Chaitra , Chandana & Keerthana
3, 5, 9	Karthik H, Karthik S
2 ,7	Ayush, Abhishek

- DELIVERY MEANS

  Project delivery method chosen is Integrated Project Delivery. The interests of the team members are aligned for the development and integration of the project and its optimal performance and the project is delivered by internal resources