MOST APPROPRIATE VENDOR ASSESSMENT AND SELECTION FOR AN EMR FOR A HOSPITAL

A dissertation report for

Post Graduate Diploma in Health and Hospital Management by

Dr. Richa Pandey

PG/O9/40

Under the guidance of

Dr Vivek Sahi

Designation: Sr. Consultant

Organization: DELL SERVICES

Mr I Bhattacharya

Designation: HOD of HIT

Organization: IIHMR, New Delhi

International Institute of Health Management Research

New Delhi

CERTIFICATE OF INTERNSHIP COMPLETION

Date:……..

TO WHOM IT MAY CONCERN

This is to certify that Mr. /Ms. /Dr. "Richa Pandey" has successfully completed his/her 3 months internship in our organization from August 9, 2010 to November 9, 2010. During this intern he/she has worked on……. (task performed) under the guidance of me and my team at……. (Organization). …….

(Any positive/negative comment)

We wish him/her good luck for his/her future assignments.

(Signature)

_____ (Name)

_____Designation

ACKNOWLEDGEMENT

I owe my deep sense of gratitude to Dr. Vivek Sahi, for giving me an opportunity to learn various aspects of Healthcare Information Technology with special emphasis on CPRS module of VistA EHR .

My special thanks to Dr. Rajesh Gupta, Principal consultant and Manager, for his guidance, support, interest, involvement and encouragement. He left no stone unturned in updating us about the subject.

I also want to thank Prof. Indrajit Bhattacharya and Dr. Anandhi Ramachandran for their constant guidance throughout the dissertation period.

My sincere gratitude to Mrs.Maitrye Kollegal, Director, International Institute of Health Management Research, New Delhi, who always has been a source of motivation and inspiration.

Table of Contents

MOST APPROPRIATE VENDOR SELECTION AND ASSESSMENT FOR AN EMR FOR A HOSPITAL..... 10

1. INTERNSHIP REPORT..... 11

1.1 ORGANIZATION PROFILE..... 11

2. DISSERTATION OVERVIEW..... 13

3. PROJECT OVERVIEW..... 15

MOST APPROPRIATE VENDOR SELECTION AND ASSESSMENT FOR AN EMR FOR A HOSPITAL..... 15

3.1 INTRODUCTION..... 15

3.2GENERAL OBJECTIVE:..... 18

3.3 METHODOLOGY..... 19

3.4 METHOD OF DATA COLLECTION..... 19

4. RESULT..... 555

4.1 LEARNINGS..... 55

4.2 CHALLENGES..... 56

4.3 CONCLUSION..... 57

5.REFERENCES..... 59

6. APPENDIX..... 60

LIST OF TABLES

1. SEQUENCE OF VENDOR SELECTION ……31
2. METHODOLOGY OF VENDOR SELECTION……..33
3. PLAN OF ACTION……35
4. RFP ……48
5. WORK PROCESSES……50
6. RFP SUBJECT AREAS …….....51
7. THE MAIN COMPONENTS COVERED BY VENDORS ….....53
8. OVERALL TOTALS TABLE……55

LIST OF APPENDIX

APPENDIX 1 Criteria for Evaluation of Electronic Medical Record System Vendors

APPENDIX 2 Risk Assessment Worksheet for System Selection

APPENDIX 3 Software Vendor Evaluation Questions

APPENDIX 4 TABLE 6

ACRONYMS

EMR – ELECTRONIC MEDICAL RECORD

EHR – ELECTRONIC HEALTH RECORD

CPRS – COMPUTERISED PATIENT RECORD SYSTEM

CARE – CENTRE FOR ALL ROUND HEALTH

ROI – RETURN ON INVESTMENT

HIPPA – HEALTH INSURANCE PORTABILITY AND ACCOUNTABILITY ACT

RFP – REQUEST FOR PROPOSAL

MOST APPROPRIATE VENDOR SELECTION AND ASSESSMENT FOR AN EMR FOR A HOSPITAL

ABSTRACT

The selection of an enterprise-wide electronic medical record (EMR) by a medical center is a major undertaking that will define its future clinical processes for many years .The parameters that drive the selection include the clinical requirements, the financial needs of the medical center, the geographic setting, the need for outreach into the community and an analysis of the existing and predicted flow of information and work within the clinical systems.

PART –I

1. INTERNSHIP REPORT

1.1 ORGANIZATION PROFILE

History

Dell Services is an information technology services provider based in Plano, Texas, USA. Peter Altabef has served as president and chief executive officer since 2004. On September 21, 2009, Perot Systems agreed to be acquired by Dell for $3.9 billion. H. Ross Perot and eight associates founded Perot Systems in June 1988 after having sold electronic data system (EDS) to General Motors. Before its acquisition by Dell Inc., Perot Systems was a Fortune 1000 corporation with more than 23,000 associates and 2008 revenues of $2.8 billion. The company maintains offices in more than 25 countries around the world, including the United States, Europe, India, China and Mexico

As a top-five finisher for the third consecutive year, Perot Systems was named to the Fortune magazine “Most Admired Companies in America” list for IT Services in 2008.

The acquisition---Dell has acquired perot systems for $3.9 billion, creating comprehensive, customer-focused IT-solutions Company. The acquisition will result in a compelling combination of two iconic information technology brands.

The expanded Dell will be even better positioned for immediate and long-term growth and efficiency driven by:--

- Providing a broader range of IT services and solutions and optimizing how they’re delivered
- Extending the reach of Perot Systems’ capabilities, including in the most dynamic customer segments, around the world
- Supplying leading Dell computer systems to even more Perot Systems customers.

Location Express Way, Noida

Perot Systems TSI (India) Ltd.

Office Plot No. 3 Sector 125, Noida- 201301 U.P

B) MANAGERIAL TASKS

Was in CPRS (Computerized Patient Record System) department wherein was assigned the tasks of making templates for the various case sheets in the hospital.
Along with that had to make reminder dialogs, health summary etc.

C) REFLECTIVE LEARNING

1) Had an in-depth view of the CPRS ,the various functions that can be performed in it .
2) Made various templates on the various case sheets present in the hospital .
3) Made reminder dialogs ,clinical reminders, health summary, health factors etc .
4) Have an overview of how to configure procedures .
5) Took part in testing (twice) .
6) Attended a future state workshop .
7) Have a basic knowledge of the various modules in the project and the project life cycle .
8) Attended meeting to gather requirements from the clients .

PART-II

2. DISSERTATION OVERVIEW

1. **Problem Statement**

   How does one identify and select the most appropriate vendor for an EMR for a hospital ?

2. **Objective**

   To study the process of vendor assessment and selection of an EMR for a hospital in order to arrive at a result which benefits the hospital in successfully achieving its target result of" providing quality healthcare" by the use of an EMR .

3. **Scope of the project**

   The project defines the usefulness of carrying out the process of EMR selection systematically and meticulously so that the hospital does not have any problem during the course of the pre- implementation , implementation and the post implementation phases of the project .

4. **Need**

   Adopting an EHR is challenging, as is using a new or an existing system for quality improvement. The vendor assesment and selection is designed to address obstacles to adoption and meaningful use by offering physicians expert assistance tailored to practice needs, delivered in physicians' own offices. The process will help stakeholders understand and benefit from process, use group purchasing power to negotiate better pricing from vendors, implement their systems successfully and train their staff, institute workflow changes to support the transition from paper to electronic records, and improve the quality and efficiency of care they provide .

5. **Benefits**

   The primary benefit of the vendor assessment will be successful EMR implementation in the hospital .

Once the EMR running smoothly all the key benefits of the EMR will be realized .

6. **Data Sources** – Secondary Data Sources.

7. **Work plan** – Activity Table

8. **Limitations**

The hospital in question could not give their official documents for the data collection of this project .Thus a quantitative study was not possible . However the staff was very co-operative in the overall making of the project .

3. PROJECT OVERVIEW

MOST APPROPRIATE VENDOR SELECTION AND ASSESSMENT FOR AN EMR FOR A HOSPITAL

3.1 INTRODUCTION

The evolution of an electronic medical record (EMR) in a medical center varies depending on the preexisting medical record system. In some instances, the process may represent only an incremental change in a partially developed computerized EMR. In other cases, it comes closer to a revolution, as it is part of a complete overhaul of a minimally computerized medical record system. In the latter circumstance, the implementation of the EMR involves much more than simply automation of preexisting processes. Strategically it requires analysis of, and change to, the underlying clinical information processes.

Tactically, the transformation from a mixed, predominantly paper record to an enterprise-wide EMR consists of three main stages:

• First, and most important, is the enlistment of the medical center community in the process. The management level (clinical chiefs, administration) and staff level (physicians, nurses, ancillary medical, clerical) personnel must be involved in developing the strategic goals and the implementation process.
• The second tactical objective is selection of a vendor for the EMR.
• The final tactical goal is the successful implementation of the new EMR. This report describes this development process, with an emphasis on critical generalized components/milestones of the process and potential barriers to success.

This report considers the requirements of the hospital alongside additional assessment criteria that consider results from EMR including electronic documentation ,electronic ordering ,charge capture, improvements to patient safety and the quality of care .The report will describe the process of appropriate vendor selection for an EMR for a

hospital .It will also address the stakeholders perception in the selection of an appropriate EMR for the hospital.

Assumption

I have taken a hypothetical hospital for the study .

CARE (Centre For All Round Health) hospital is in the business of providing quality services at its facilities , currently in one city. The nature of business is such that there were hardly any information management systems available which could fulfill CARE's unique requirement .Hence CARE decided to have an business critical application – Hospital information system .

It is a 500 bedded hospital located at central Delhi. Apart from the HIS the acquision ,installation , implementation and maintenance of the IT infrastructure as well as management of the IT services was being undertaken by it .For long CARE has felt the need for a patient centric lifelong electronic health record that provides a holistic view of patients health status and history as opposed to niche problem solving and decision making techniques for limited diagnostic purposes .

In order to facilitate electronic records a knowledge base is required which the hospital is lacking. It is thus proposed that an established EHR would give a scope to use the existing world standards wherein the EMR would be acceptable to insurance companies as well as to physicians.

This project was taken because CARE needs to to support its mission, vision, goals , objectives, and strategies. It is beyond any doubt that the automation of hospitals is a reality and every hospitals business is a healthcare business .
As this is a service oriented business the management of CARE will think from the patients point of view. The management will have to make their services more effective, give more care , have less medical errors etc.

In order to achieve it CARE hospital decided to let the industry experts come and to guide CARE as to what to do. Towards this end experts have been asked to study the current

state of IT preparedness and propose a model of IT service delivery which would fulfill the requirements of CARE in the future .

Return on Investment Expectations

As with any such expensive undertaking, it was necessary to explicitly address the issue of the expected return on investment (ROI) for an enterprise-wide EMR.
ROI analysis fell into three categories —

- financial,
- clinical
- operational.

The financial returns are tangible, but difficult to measure.
Financial improvements are related to:

1. reduced length of stay,
2. cost reductions associated with risk reduction of adverse drug events,
3. reduced pharmaceutical costs derived from having information available at the time it is needed,
4. expanded technical capability and support of specialty services as needed,
5. improved billing accuracy and charge capture, and
6. improved materials management and supply chain management.

The second category of ROI expectation is clinical, which has two components:

1. Improved patient care
2. standardized care

Reduced adverse drug events and improved decision making can directly demonstrate improved patient care. An underlying decision support capability that evolves over time should provide a substantial improvement in care delivered, both in terms of quality and cost.
The second clinical component, standardized care, is a way of managing outcomes by use of evidence-based clinical guidelines embedded in the decision support component of the EMR.

The third ROI expectation is operational, which is specific to CARE.

CARE has one clinical systems — HIS .It needs to be replaced due to its inability to provide adequate clinical support in the present healthcare environment .While this is not an overriding driver of the replacement decision, it is a strong justification for investing in an integrated core clinical information system.

3.2GENERAL OBJECTIVE:

The objectives of IT outsourcing and EHR implementation are :

Allow CARE to focus on its core business of providing healthcare services

Strenghtening of information system at CARE

Bringing IT best practices to CARE

Introduce automation and standardization of processes

Enable information exchange between disparate systems

Physician friendly information systems which are intuitive for their specialization

Simplification of recording sharing and communicating patient medical records

Facilitate continuity of care

Reduce medical errors

Improve quality of patient care

The specific objectives are:

1. Design a framework for assessment on the basis of product selection and vendor selection

2. Assess the overall requirements of the hospital for the EHR .

3.Allow CARE to focus on its core business of providing quality healthcare.

4. Do the vendor assessment for the EMR

5.Reduce medical errors.

3.3 METHODOLOGY

The project is based on secondary data collection .

3.4METHOD OF DATA COLLECTION

The document will be derived from following sources:

o Official CARE Manuals.

o Previous experience of persons in the project

o Other literature on vendor assessment

2. PROJECT MANAGEMENT PLAN

Work plan

ACTIVITY	TIME TAKEN
Defining the Problem	ONE WEEK
Literature Survey	10 DAYS
Methodology Adopted	2 DAYS
Data Collection	ONE MONTH
Compilation and Analysis	ONE MONTH
Documentation	ONE WEEK

Questionnaire

Vendor Selection Check Sheet

3. LITERATURE SURVEY

Market Definition of EMR

The EMR is owned by a single-provider organization (i.e., hospital, physicianpractice, or integrated delivery organization and is the digital equivalent of the legal paper "medical record" of care provided across encounters at that provider organization. It organizes and reformats data captured in (or transcribed into) electronic form from other, independent departmental clinical information systems such as lab, pharmacy, or radiology, as well as those of external providers such as commercial laboratories. Digitized images of paper documents as well as images of diagnostic procedures (e.g., x-ray exams or EKGs) may also be included in the EMR.The definition is the basis by which the products discussed in this report are referred to as EMR products , despite the fact that many of these vendors market their products as EHRs.

Abstract 1

A Critical Pathway for Electronic Medical Record Selection
Anne Holbrook, MD, PharmD, MSc1,2, Karim Keshavjee, MSc, MD1,
Karl Langton, MSc1, Sue Troyan, RT1, Susan Millar1, Sonny Olatunji1,
Centre for Evaluation of Medicines, St Joseph's Hospital1; Division of Clinical Pharmacology, Department of Medicine2; Hamilton-Wentworth Family Medicine Inc.3

Electronic medical records (EMRs) are increasingly becoming a necessary tool in health care. Given their potential to influence every aspect of health care, there has been surprisingly little rigorous research applied to this important piece of emerging health technology. An initial phase of the COMPETE study, which is examining the impact of EMRs on efficiency, quality of care and privacy concerns, involved a rigorous “critical pathway” approach to EMR selection for the study. A multidisciplinary team with clinical, technical and research expertise led an 8-stage evaluation process with direct input from user physicians at each stage. An iterative sequence of review of EMR specifications and features, live product demonstrations, site visits, and negotiations with

vendors led to a progressive narrowing of the field of eligible EMR systems. Final scoring was based on 3 main themes of clinical usability, data quality and support/vendor issues. We believe that a rigorous, multidisciplinary process such as this is required to maximize success of any EMR implementation project.

Abstract 2

Samuel W. McDowell, PhD, Regi Wahl, and James Michelson, MD

The selection of an enterprise-wide electronic medical record (EMR) by a medical center is a major undertaking that will define its future clinical processes for many years.The parameters that drive the selection include the clinical requirements, the financial needs of the medical center, the geographic setting, the need for outreach into the community, and an analysis of the existing and predicted flow of information and work within the clinical systems.

BENEFITS OF EMR

The IT implementation at CARE will not only benefit the management and physician community, but it will also be extremely advantageous for the patients.

1. **Speed**

   As it is a known fact the business world of the 21st century is fast-paced. Even in medical practices, speed equals ability to compete, especially when managing information. That is why an electronic medical record system, or EMR, is used by most medical practices. In addition, a fast electronic medical record system requires less time invested in trouble shooting and allows more time invested in caring for patients.

2. **Storage**

   An electronic medical record is an electronic database of information capable of carrying much more information than traditional systems. An electronic medical record system can manage records from multiple offices as well as multiple types of records.

3. **Security**

   An electronic medical record system secures records with backup files in case of emergencies. In addition, only authorized users may access them. This double security system is a "preventative medicine" for record viruses.

4. **Support**

   Both practices and patients can access customer support from a medical billing specialist provided through the electronic medical record software. In addition to their support, electronic medical record software provides access to medical codes, including, ICD.9, HIPAA, HCFA 1500 .

5. Accessibility

The latest electronic medical record technology allows information to be downloaded directly onto a PDA or Palm device. In addition to PDA access, authorized individuals can access an electronic medical record online from any location.

6. Affordability

This is perhaps the most appealing part of the latest electronic medical record technology. Every business wants to save money while at the same time adopting time-saving technology. Because electronic medical record software uses online technology, much of the set up costs and overhead are eliminated and reduced to monthly usage fees.

7. Infrastructure

Part of the money-saving nature of electronic medical record technology is the elimination of IT infrastructure and the streamlining of multiple databases. The infrastructure is simplified into one online database, even for multiple offices.

8. Versatility

There are multiple office management with electronic medical record software, but there is much more to this software than meets the eye. Electronic medical record software stores medical transcription SOAP notes and medical codes. It allows multiple users. It also connects users to personal and online support sources.

9. Efficiency

Efficiency is not the same as speed. Efficiency takes all of the duties involved in medical record and medical office management divided by time and money.

Electronic medical record software can increase the numerators and decrease the denominators. Businesses often ask about the bottom line. The math says it all.

10. Manageability

The benefits of an electronic medical record may sound wonderful, but there is one more question to ask: Is it user friendly? When adopting new technology, remember that the master needs to ride in the saddle, not the horse. Some technology requires so much attention that a business owner may be worried that he or she is now employed by the new technology and not the other way around. Electronic medical record software works for businesses.

A word of advice: in any given search engine there are millions of indexed pages that will appear as relevant results to a search for "electronic medical record", or "EMR". Use these benefits as search sifters, to identify the right electronic medical record software to work for your practice.

Overview of market -Major Players

Some of the major EMR providers in India include:

- GE Healthcare
- IBA Health
- VEPRO
- Siemens
- Karishma Software
- Sobha Renaissance IT Pvt. Ltd.
- 21st Century Healthcare solutions
- Softlink International
- Prognosys
- Srishti Software
- CDAC
- Televital

Some of the hospitals in India using EMR are:

- Amrita Institute of Medical Sciences, Coimbatore
- Apollo Hospital, Chennai
- Artemis Healthsciences, Gurgaon
- Christian Medical College, Vellore
- Fortis Hospital, Mohali and Delhi
- Manipal Hospital, Bangalore
- Max Devki Devi Hospital, Delhi
- P D Hinduja Hospital, Mumbai
- Ruby Hall Clinic, Pune
- Sahyadari Hospital, Pune
- Sri Sathya Institute Of Higher Medical Sciences, Puttaparthi
- Sri Sathya Institute Of Higher Medical Sciences, Bangalore
- PGIMER, Chandigarh

For the Indian EMR market the key market drivers are:

- Cost Saving. Benefits in terms of cost savings result from space, manpower and time required to maintain paper-based records
- Process efficiency. Reduced time; as in waiting time, reporting time, administrative functions, etc. make processes more efficient
- Better work flow through accessibility and availability.
- The records are available anywhere, any time through the use of hand-held devices, wireless technologies and are accessible remotely
- Increase in Medical tourism. Efficient and quality processes of a hospital encourage more foreign patients to access these healthcare facilities at low costs thus promoting medical tourism
- Increasing competition amongst hospitals. With the increasing number of state-of-art healthcare facilities coming up, the competition is increasingly motivating hospitals to provide better quality to stay in business

- Increasing awareness and demand for quality healthcare. With increased healthcare awareness and changing lifestyles, a demand for quality services is compelling hospitals to provide better facilities and services

Market Restraints

- High application cost: high cost of implementing EMR is affecting hospitals' move due to budget restraints.
- Work flow Interruption: the transition to EMR systems is slow and requires a lot of dedication from all the stakeholders involved - from management (key decision makers) to end users (clinicians, nurses etc.), which could ultimately affect the normal work flow drastically.

Benchmarks for Evaluating our Choice of EMR

Selecting the best EMR solution for your needs:

In a hospital, we probably only have one opportunity to choose the right EMR solution, not just because time is of the essence, but because resources are precious. As we evaluate potential EMR solutions, the following benchmarks can help us arrive at a decision that makes the most sense for our organization.

Benchmark 1: Designed for your type and size of hospital

Beware of vendors who claim to offer an EMR solution designed to fit any size or type of facility. Instead, narrow your search to those with a proven track record of specializing in solutions and support for critical access and community hospitals. Be particularly cautious of vendors who have just entered the community and critical access hospital market with no prior experience.

Here's why: In theory, it's true that a high-end solution (i.e., built for larger hospitals) can be downsized" for critical access or community hospitals. In reality, however, these complex systems may be difficult to deploy on a smaller scale. Moreover, all of the extraneous features and the complicated screens may hinder acceptance by your employees and clinicians which could lead to adoption failure – if it is not easy, it will not get used.

A “right-sized” EMR solution with a strong track record, by contrast, stands a better chance of being well received, especially if it offers an intuitive user interface and incorporates input from clinicians during the software design process.

Support is another important consideration. Vendors who deal primarily with large hospitals may not give priority to their critical access and community hospital customers — a definite disadvantage should you happen to have an urgent question or service need.

Benchmark 2: A one-stop EMR resource

Some vendor possess the information technology (IT) expertise and resources to manage the full spectrum of an EMR deployment, encompassing planning, installation, data migration, training, support, and more- allowing us the opportunity to choose best-of-breed products for their information system and components.

Most likely, we’ll be better served by choosing a vendor who can supply a complete product and service package, including a single phone number to call for any support need 24 hours a day, 7 days a week.

Besides lightening the burden on our IT staff, this one-stop approach will prevent finger pointing or passing the buck should there be a problem with application interfaces.

Benchmark 3: Software and vendor flexibility

Some EMR vendors impose rigid terms and conditions which may be undesirable for community and critical access hospitals.

Seek out flexibility, especially at three key levels:

• Implementation• — Does the vendor dictate the implementation of a complete solution all at once? For many critical access and community hospitals, this can be prohibitively expensive. Other vendors will allow you to implement their software module by module, as your budget allows. In addition to easing the financial impact, a phased implementation can yield practical advantages. Specifically, it will allow your organization to adjust gradually to a new system and new improved workflows, while minimizing disruptions to clinical and financial operations.

• Workflows• — Ideally, an EMR solution will encourage workflow improvements, helping to add more efficiency to your processes.

Moreover, the solution should contain features that are specifically designed to enhance workflow, such as:

- electronic results sign-off;
- real-time access to patient charts and data; and
- a clinician messaging/communication tool.

• Documentation• — Some physicians have been particularly slow to embrace EMR technology. Flexibility in how the solution captures documentation can go a long way toward winning them over. Besides intuitive templates, advanced solutions will permit documentation via free texting on a keyboard and/or voice capture of dictation.

Benchmark 4: Adaptable technology

Perhaps surprisingly, some "state-of-the-art" EMR applications are hampered by a rigid or outdated underlying architecture. These solutions typically do not adapt well to change. For example, as new reimbursement procedures and regulatory requirements are instituted (an inevitable fact of life), the vendor may be unable to deliver software updates which reflect these changes. Moreover, the EMR installation may require costly redundant databases, and the EMR software may be difficult to integrate with other applications.

Make sure you consider only solutions with a flexible architecture, adaptable to the constantly evolving realm of healthcare. Specific must-have characteristics include:

· Allows direct access to data housed in a relational database

· Enables users to view and interact with data in a way that fits their needs

· Presents a consistent interface for all users in the organization

· Has capabilities to capture and report measures required to demonstrate "meaningful use"

Benchmark 5: CCHIT Certified

In 2005 the U.S. Department of Health and Human Services recognized the Certification Commission for Healthcare Information Technology (CCHIT®) as the official certification body in the United States for health information technology, including electronic health record (EHR) products, personal health record (PHR) products, and the health information exchanges (HIEs) over which they share information.

Encompassing ambulatory and inpatient care settings, CCHIT certification means that the tested EMR software meets industry standards for functionality, security and compatibility with other clinical systems. The CCHIT testing process uses real-world medical scenarios, helping to ensure the software will meet the documentation needs of providers and quality care standards for patients.

In India there is no such certification as such for the time being.

Benchmark 6: validation

Virtually all EMR software vendors claim to offer "superior" products and service. But what's their verifiable track record?

It is very important to have an authentic vendor who has a good image and brand name in the community .All credential of the vendor must be checked thoroughly before even making the initial list of the vendors .

Benchmark 7: Positive peer reviews

There's no substitute for getting appraisals directly from your peers in community and critical access hospitals. In checking out references provided by the vendor, keep the following in mind:

- Site visits are preferable to phone calls or e-mail exchanges.
- Request the opportunity to see the software in action and
- Get feedback from frontline users in various departments.

Verify that your contacts do not have a vested interest in the product beyond a client-vendor relationship (i.e. are not stakeholders or resellers).

Ask very specific questions about the vendor and software .

Benchmark 8: A detailed projection of ROI

Every hospital will realize a different return on investment (ROI) based on a number of factors. However, you should request from vendors a picture of average ROI, including approximately how many years it will take to fully recover your investment.

Ask for specific metrics within their ROI formulas. For example, what are the revenue implications of eliminating lost charge slips? How much can you reduce labor costs by automating the entry and tracking of charges and insurance verification?

The bottom line should show a positive financial outcome in five years or less.

Benchmark 9: Risk analysis for hardware and software design

Medical product designers have used risk management techniques to help reduce the risks associated with device hardware. BS/EN/ISO 14971 has traditionally been adopted as the base standard for risk management for medical devices. The 2007 version of this standard is considerably extended from its previous version, and the techniques described are now intended to be applied to both software and hardware systems.

Benchmark 10: Multisite Support

Last but most important that software should support easy information exchange between various sites (if the hospital has branches). There should be proper encryption of data so that data cannot be intercepted in transit through internet etc.

TABLE 1

The sequence in which vendor selection is done is :

The methodology of this report is designed to provide an objective analysis of the large practice EMR space that will assist providers in determining the electronic medical record (EMR) technology and vendor best suited to their practices, existing IT environment, and business needs. The process to compare technology providers with offerings in the EMR space that are directed at practices with more than 20 providers. The vendors that are covered are for for large practices offer systems that are well suited for use in this market, including practices with more than 20 providers,. However, a number of the systems in this report have been used successfully in smaller practices, and many are also discovered in the List for small and midsize practices .

For this reason, the vendors covered in this report are restricted to those that have specialized in or have significant market share in the large practice market. Several criteria for the large practice report vary from the small and midsize practice report; these are noted in the definitions of the criteria.

Vendors can be classified for different types of hospitals catering to different business needs .

1.Big hospitals

2. Medium sized hospitals

3. Small hospitals

Big hospitals

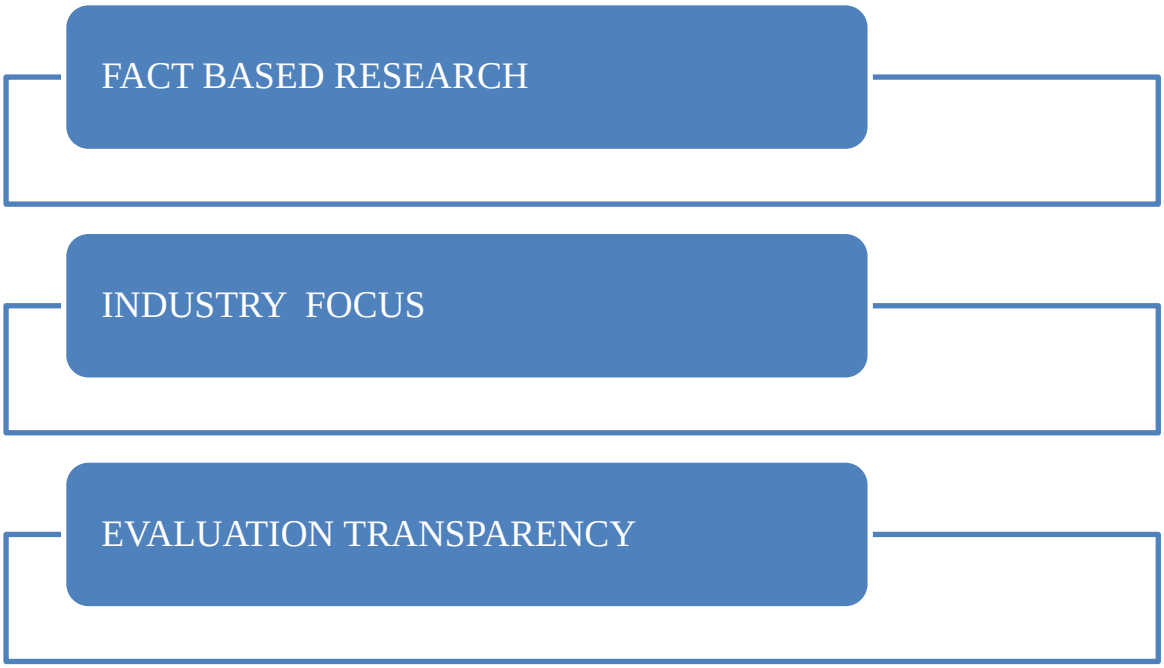
Use of EMRs in large ambulatory practices with more than 20 providers can result in benefits, including migration from paper charts to a paperless environment with ubiquitous availability of clinical information, electronic ordering, charge capture, and improvements to patient safety and the quality of care as a result of features such as clinical decision support. Large practices also see economies of scale that accrue with process efficiencies upon EMR introduction, as improvements to charge capture, documentation, and billing practices enhance revenue for the practice, driving return on investment. However, selecting the right EMR and choosing functionality that meets the needs of the many providers in the practice without creating unnecessary complexity or support costs are critical

Small hospitals

Use of EMRs in small and midsize ambulatory practices can result in many of the same benefits as in large practices, such as those that result from the migration from paper charts, electronic ordering, charge capture, and improvements to patient safety and the quality of care as a result of feature such as clinical decision support. However, small practices do not see the economies of scale that accrue with process efficiencies upon EMR introduction in larger practices, making the initial investment quite formidable and the ROI questionable for many small practices. For small practices, selecting the right EMR and choosing functionality that meets the practice's needs without creating unnecessary complexity or support costs are critical.

TABLE 2

The methodology shown here is based on three criteria that is believed to be essential in the selection of an inpatient EMR supplier:



In the course of developing this evaluation, the following steps were taken :

● The scope of the market to be evaluated is defined, and the associated vendors to be evaluated are determined. Technology suppliers selected included those considered to be current or upcoming leaders in the market. Leadership is determined by the analyst and based on the supplier's current customer base, technology offering, and their business model's viability.

● Criteria for evaluation are determined and weighted. A management review is undertaken to ensure the appropriateness of the evaluation and to minimize analyst bias.

● Vendors are notified of the upcoming evaluation and given the opportunity to provide data regarding their product offering and business model

● Customers are interviewed, with up to three interviews taking place with customers of each vendor under evaluation; all such interviews were conducted during the past 12 months.

● The Short List criteria and tool are used to evaluate each vendor and develop the Short List evaluation.

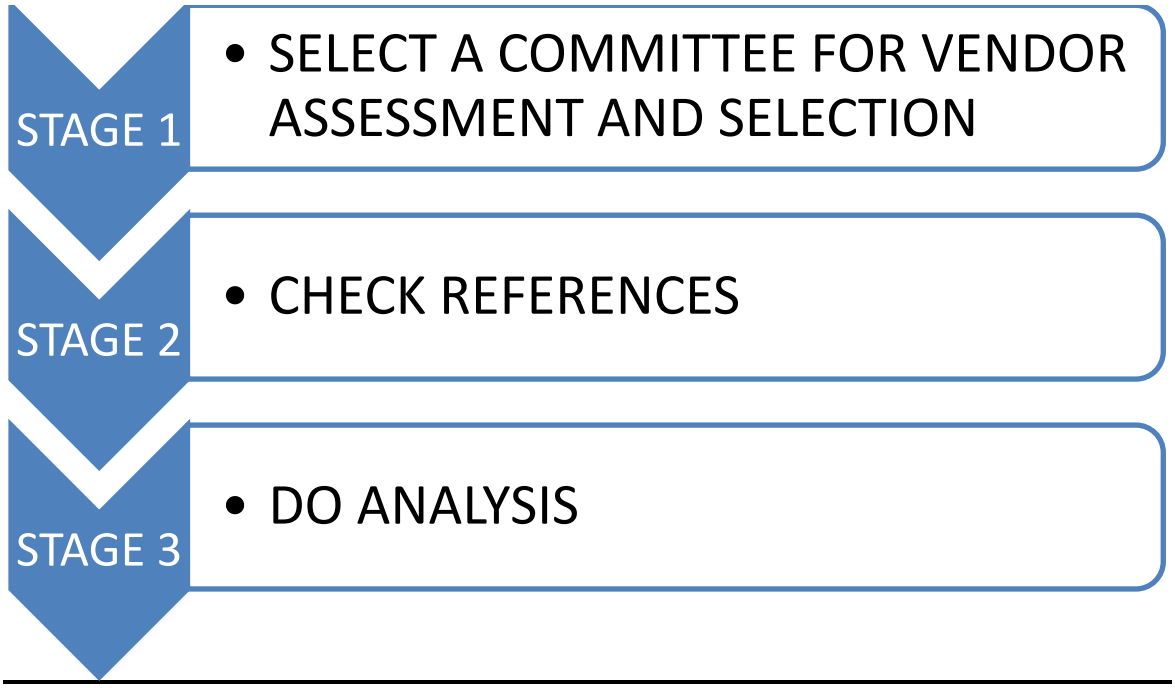
● The Short List evaluation is shared with participating vendors, which are given an opportunity to review the information for factual accuracy and submit any comments or questions to the analyst for review.

● The Short List evaluation is then published. It will be updated periodically, as warranted by the evaluation of the market and new product offerings. During the course of the evaluation, each participating vendor was contacted and provided with an opportunity to participate actively in the evaluation process. A number of vendors were invited but chose not to participate in the evaluation and are not included in this report.

In the large practice EMR space, Epic is covered but it was not an active participant in the research process. Coverage of Epic is based on secondary research with end users and research on the vendor.

TABLE 3

PLAN OF ACTION



STAGE NO.1

To begin, we will establish a committee which will include both administrators and members of the technical, business, and IT departments our committee will establish some guidelines for what they need from an EMR system vendor.

The committee will then select the main criteria on which to base our ultimate decision:

1) The biggest expectation CARE has from the IT bases solution is the interoperability, since it is a multispeciality hospital and has plans of expanding in different geographical locations, (in future) and it is very important for us to maintain a proper, easy yet a safe data exchange system.
2) The government norms and legalities should be complied with , so the system we will be using is acceptable and is user friendly at the same time .
3) The vocabulary and the nomenclature being used in the system should also be usable ..
4) The hospital wants a system which would give it the ability to create, modify and design powerful graphically-based EMR templates .
5) The hospital's vision is "to provide quality health care services to one & all" we will look into various aspects while choosing a suitable software for our hospital, to ensure quality and maximum reach to all the stakeholders .

STAGE NO. 2

a) Check References

When it comes to check the usability of any software .We need to know what really happens when it comes to implementation. There are always issues when it comes to software, so the real question is how are they handled? So we will make calls to several references, not just the top five references a vendor offers you but till the time we find a customer who has had a problem. Some of the best references will show how the company deals with problems that may arise. And for the same we will ask for a complete list of the vendor's customers.

b) Consider the Level of Support

Staff members who need to work may need help with new applications So we will determine if there is a toll-free line, Web support or e-mail support present 24 by 7 if any need arises from the hospital side.

c) Cost of the support

The cost of support will vary from vendor to vendor. Many will charge an annual maintenance fee, which is calculated from a percentage of the software's price, to provide support. So this is another point which we will keep under consideration.

d) Up-gradations

We will determine how often we will get upgrades, how much they will cost and what is included in an upgrade. Generally, patches that are used to fix minor software problems are offered free of charge since they only update one area of your software. New releases, on the other hand, introduce new functionality and are handled differently depending on the vendor. So,

This we will have to check that how will we get the upgrades and if they will be charged extra or not.

e) Implementation & Integration

Before buying the software, we will have to think about how it has to run with the existing systems and business processes (if any already present). For e.g. if the hospital already has an HIS and is now going to implement an EHR, the information/data already present in the older system has to be integrated with the new system. So we will check the feasibility of this integration.

f) Expandability

CARE has plans of expansion so we will enquire about the data load, if that is scalable as per our requirements both for increasing patient influx from hospitals already present as well as from the new branch and the software’s acceptability in various parts of the world.

g) Vendor Stability

There are several issues to investigate when verifying vendor stability. We will try to find out how long a company has been in business, how many employees it has, and who is dedicated to various responsibilities such as support, development, quality assurance and testing .

h) Cost

Here we will consider if the cost fit our budget. What is included in the quote , are there any hidden costs,how much will you pay in taxes by dealing with different vendors..

i) Functionality and Technical Requirements

Here we will check if the solutions proposed meet our needs is it user friendly, What security features are included ,will it make the information exchange any easier? All these considerations and their fulfillment will help the hospital to achieve its vision & goals.

j) Hardware ,Networking and other requirements

We will determine what kind of hardware is needed and whether it meets the IT department's standards and can it provide the infrastructure and hardware that is required .The robustness of the software for safety and data security also needs to be looked into.

STAGE NO.3

On the basis of all above considerations we will do a gap analysis so as to check the compatibility of the hospital with all the available options. This analysis will keep a track of the expectations and provisions which are matching between the hospital and various IT companies individually. Choosing a suitable IT vendor for the hospital would require a careful understanding and analysis of the expectations and features of both the hospital as well as the IT Company. To do this comprehensive analysis out plan of action will be having three different stages viz. the following:

1) We will look into the expectations of my hospital, from the product , hospital's long term goals, vision and how will automating help in reaching this vision
2) We will see what various IT companies are offering as IT solutions.
3) We will then check the compatibility between hospital's requirements and the IT vendors provisions by benchmarking various vendors on the basis of best possible and available solutions

STEPS IN VENDOR SELECTION

Steps taken to ensure that only that vendor is selected whose final product is able to support complete Information exchange in the hospital

a) Select process (*who decides ,what must be done ,what judgments must be made etc)*
b) Select attributes (*ease of use ,cost ,reputation of the vendor in the market etc .Ask directly for additional attributes ,arrange the attributes in a hierarchy ,take notes*)
c) Rate vendor performance
d) Set priorities
e) Recommend action
f) Document action

• First of all, listing down of all the requirements of the hospital information system through site assessment and proper evaluation.
• Then Listing down all the vendors in the market, doing some research on them to have sufficient awareness about their products, reputation, success and evaluating their live softwares.
• After research, short listing some vendors who have successfully implemented EMR with health information exchange being the main focus.
• Calling the short listed vendors, showing them the requirements.
• Prioritizing the vendors on the basis of the requirements fulfillment.
• Ensuring that the main HIE requirements are fulfilled.
• Having a demo for the health information exchange process.
• Evaluating the few selected vendors on the basis of their price quotes.

• Selecting the vendor which fulfills most of the requirements including the important ones like of information exchange in minimum cost

• All the information of the selection process should be documented properly . Information of what was selected ,what was the process ,why was it selected ,what contingencies were thought through etc.

Selection Milestones

Seven significant milestones were identified in the selection process:

1) Establishing the decision team .While the membership of the team had evolved over time, the core of the team remained constant .
2) Establishing and agreeing upon the selection criteria. This had been done at the beginning of the project, but it was not until toward the end of the project that serious consideration was given to the relative ranking of criteria. Establishing the importance of each criterion, along with refining the criteria, permitted meaningful comparisons between vendors
3) Developing a pro forma clinical strategy as well as an implementation strategy. This helped to substantially focus the team's thoughts and gave the team a baseline against which to evaluate the vendor offerings .
4) Conducting product demonstrations. Demonstrations occurred at several junctures throughout the process, each with a different focus..
5) Distributing requests for proposal . Five addenda to the RFP were issued for further clarification on significant issues, requiring documented responses and cross-vendor comparison. As the vendors became accustomed to the format of the RFP, they were able to respond rapidly, frequently within a few days.
6) Conducting site visits. There were several types of site visits, including visits to customer sites and vendor headquarters.
7) Recommending a vendor. The final milestone was a recommendation to the corporate officers with the vendor of choice.

4.CURRENT SITUATION ANALYSIS

CARE is a tertiary care hospital, located in Delhi. CARE wants complete IT solution from the vendor of choice .From a clinical perspective, such an EMR had to fulfill three strategic goals:

• The first goal was to select a vendor that will provide the core clinical systems necessary to achieve its clinical and strategic objectives.

These were

(1) supporting the work of CARE Hospital clinicians;

(2) supporting the work of non-CARE clinics and hospitals, some of whom are affiliated, the remainder of which are primarily referral sources of patients; and

(3) supporting the community with a statewide longitudinal patient healthcare record.

• The second goal was to create an e clinical patient record with the attributes identified by the hospital for content and functionality. It was understood that any plan for implementing the system would encompass significant capital requirements, operating requirements, and process changes over a long-term rollout.

• The third goal in selecting and implementing a system was to initiate a change management process within the clinical arena. By this, we are really talking about two different issues:

First, the identification of critical clinical process flows so they can be modeled ,replicated, and improved; and second, the actual management of implementing the workflow manual, paper-based clinical care process.

CARE does not want to simply replicate the existing paper processes on the computer. In analyzing the workflow processes, a balance has to be struck between fulfilling the perceived needs of the users and actually changing those processes for the better. Doing so requires the active involvement of all the constituencies concerned so that the best possible design is achieved, and to ensure the acceptance

of the final product by all the major groups of users.

REQUIREMETS OF THE HOSPITAL

One has to ensure that the vendor whose final product is able to support complete information exchange in CARE is the vendor of choice.

Identifying the key stakeholders

First of all, for specifying the objective requirements we have to identify the key stakeholders. The key stakeholders for this project from the hospital side are :

- **Administrators**
- **Healthcare Professionals**
- **Patients**

Requirements of the product from the administrators point of view :

The hospital requires a comprehensive solution for aggregating and securely sharing clinical data across the hospital . So the product should support the following :

- **Connect** local systems with national or international networks.
- **Flexible Architecture**: Federated, consolidated, and hybrid approaches must be supported, enabling all institutions and healthcare providers to share data efficiently, effectively, and reliably.
- Clinical data extracted from a wide variety of different source systems, in different formats, need to be transformed, exchanged, aggregated and presented in an integrated, **patient-centric view**, preferably episode-centric, **using a common interface.**
- **Dynamic Bi-directional Data Flow**: Data must be extracted from and imported into electronic health record applications.
- **Real time data transfer.**
- **Web Services**: The components of the system need to be loosely-coupled services, preferably Web services, allowing for incremental addition of new services as the exchange evolves.
- **Aggregated Data Analysis:** Support for analytical purposes such as patient based analysis, quality improvement, evaluation, etc.
- **Terminology**: The product should facilitate the translation between different standard

medical vocabularies, including SNOMED, ICD 9/10, CPT, Rx Norm, and LOINC.

• **Security**: The product should ensure the security of data.
• **Access**: With the EHR framework in place, any IHE conformant clinical application may access the data and services that have been exposed by the HIE.
• Help **organization immediately connect to all their physicians while preserving current IT infrastructure investments.**
• **Ensure efficient creation, distribution and management of the reports**, making sure they are accurate and completed cost effectively.
• **Reduce complications and medical errors, optimize patient flow, identify causes of problematic outcomes.**
• **Reduce the cost, turn around time, and risk** of using an electronic health record system

Requirements of the product from the administrators point of view :

Our hospital requires a comprehensive solution for aggregating and securely sharing clinical data. So the product should support the following :

• **Connect** local systems with national or international networks.

• **Flexible Architecture**: Federated, consolidated, and hybrid approaches must be supported, enabling all institutions and healthcare providers to share data efficiently, effectively, and reliably.

• Clinical data extracted from a wide variety of different source systems, in different formats, need to be transformed, exchanged, aggregated and presented in an integrated, **patient-centric view**, preferably episode-centric, **using a common interface.**

• **Dynamic Bi-directional Data Flow**: Data must be extracted from and imported into electronic health record applications.
• **Real time data transfer.**

•**Web Services**: The components of the system need to be loosely-coupled services, preferably Web services, allowing for incremental addition of new services as the exchange evolves.

• **Aggregated Data Analysis:** Support for analytical purposes such as patient based analysis, quality improvement, evaluation, etc.

• **Terminology**: The product should facilitate the translation between different standard medical vocabularies, including SNOMED, ICD 9/10, CPT, Rx Norm, and LOINC.

• **Security**: The product should ensure the security of data.

• **Access**: With the EHR framework in place, any IHE conformant clinical application may access the data and services that have been exposed by the HIE.
• Help **organization immediately connect to all their physicians while preserving current IT infrastructure investments.**

• **Ensure efficient creation, distribution and management of the reports**, making sure they are accurate and completed cost effectively.

• **Reduce complications and medical errors, optimize patient flow, identify causes of problematic outcomes.**
• **Reduce the cost, turn around time, and risk** of using an electronic health record system .

Requirements of the product from the healthcare professionals point of view are as follows :

• It should **preserve** the systems that healthcare professionals are already using.
• **Deliver benefits to clinicians and other users** early in the deployment process.
• **Clinical DSS** - The system must provide support for basic clinician decision support such as reminders, alerts, etc..
Terminology - The product should facilitate the translation between different standard medical vocabularies, including SNOMED, ICD 9/10, CPT, Rx Norm, and LOINC.
• Physicians should **instantly receive clinical data** directly into their EMR.
• **Easy ordering and referring features**.
• **Easy to use and less time** taking.

Requirements of the product from the patients point of view are follows:

• The system needs to provide a framework to capture the **consent declarations of consumers** and enforce those declarations across the exchange.
• Clinical data extracted from a wide variety of different source systems, in different formats, need to be transformed, exchanged, aggregated and presented in an integrated, **patient-centric view**, preferably episode-centric, using a common interface.
• **Security**: The product should ensure the security of data.
• **Quality improvement** in healthcare.
• **Reduction in cost of treatment**.
• **Quick , easy and universal access** to their records.

Underlying Assumptions in Selection of an EMR

Before considering any vendors or products, considerable effort was expended developing the overall structure of an EMR that would fulfill our functional requirements. The core of the EMR is an enterprise-wide clinical data repository that is closely linked to the major documentation, order-entry, and scheduling components. This permits dissemination of timely, accurate data throughout the medical care process, and provides the opportunity for effective decision support. Data, in the form of text and images is fed into the core through standard interfaces to laboratory, radiology, pharmacy, and other systems. In many cases, the data exchange between the ancillary systems and the core is bi-directional in order to provide for clinical alerts, decision support, clinical task creation, etc. The clinical core is accessible to clinicians through multiple modalities (workstations, PDAs, etc.).

The initial stages of this process highlighted the fact that the success of an implementation strategy would be dependent on clearly articulated clinical/organizational objectives. Identification of these aims would keep the organization focused and help guide the vendor selection process. The prime clinical goal is to improve care. Commitment to this resulted in the functional requirements of core clinical system integration to facilitate the provision of accurate, real-time clinical data, as well as a decision-support mechanism to identify and promote optimal clinical decisions.

Other important clinical goals include improving the satisfaction of patients with their encounters at CARE, improve the ease of clinical documentation and system use by the clinicians, improve
cost accounting methodology with respect to clinical (e.g., critical pathways, best practices implementations) and nonclinical functions (e.g., supply chain management, revenue cycle management), and develop an effective mechanism to deliver healthcare to a geographically dispersed community.

Initiation of the EMR Selection

Process

Once the medical center leadership identified the potential need for a significant change in the health information management system, the IT Department was tasked to develop a conceptual framework for an EMR that would be appropriate for CARE. The first activity following this was a presentation of the program scope to corporate officers of CARE. Corporate officers are the executive committee of Fletcher Allen consisting of chief executive officer, chief nursing officer, chief
medical officer, chief operating officer, chief information officer, senior vice president of human resources, and senior vice president of business and planning, who make all policy and significant
operational decisions.
Once approved by the corporate officers, the concept was presented to the Management Committee, which consists of the corporate officers plus the department chairs of the medical departments.
It was important to engage the clinical and business leadership as early as possible in the decision-making process to enlist their aid in progressing with the project.
A small decision team was established, which would be the focus of the ongoing analysis and vendor selection decision process. It consisted of a representative team of leadership from within the organization, which included the chief medical officer, the chief nursing officer, the chief information officer, and several physicians spanning inpatient and outpatient practices, specialty, and general medicine. Two of the physicians also had training in informatics. In addition, the team had a registered nurse ,a senior technical

architect, and a senior project manager to ensure adherence to budgets, schedules, and project objectives.

The project had continuing high visibility with the corporate leadership throughout the selection process.

Three other groups within CARE worked with the key leadership, and provided analysis as they participated in the process. First there was a nursing group, consisting of approximately 15 CARE nurses whose primary objective was to review the clinical aspects of the vendors' products.

Second, there was participation from business and clinical department leadership as needed.

In addition to clinical leaders, leadership from human resources, budget and finance, patient financial services, registration, and scheduling were also involved in the process.

Third, all CARE employees were invited to, and participated in, various presentations.

While it was understood that this was not a voting process, employee feedback was strongly encouraged and presented as a way for everyone involved to contribute to the decision as well as help outline the clinical and functional requirements for the recommended system. As a complement to the expertise within CARE , a number of external resources were used. They were a Consulting firm, who provided high-level insight about clinical vendors; another group, who provided domain expertise as well as process advice; another group which helped with Consulting,(who helped with implementation strategies and domain expertise). On an ad hoc basis, CARE also discussed its directions and mutual opportunities with other customers.

The value of identifying the strategic issues at the inception of the project had two major benefits:

First, it highlighted existing process issues necessary to be resolved prior to implementation.

Second ,it generated an initial implementation strategy consisting of pro forma project plans, which remained a useful baseline against which to evaluate vendor proposals throughout the selection process .

Preliminary Vendor Screening

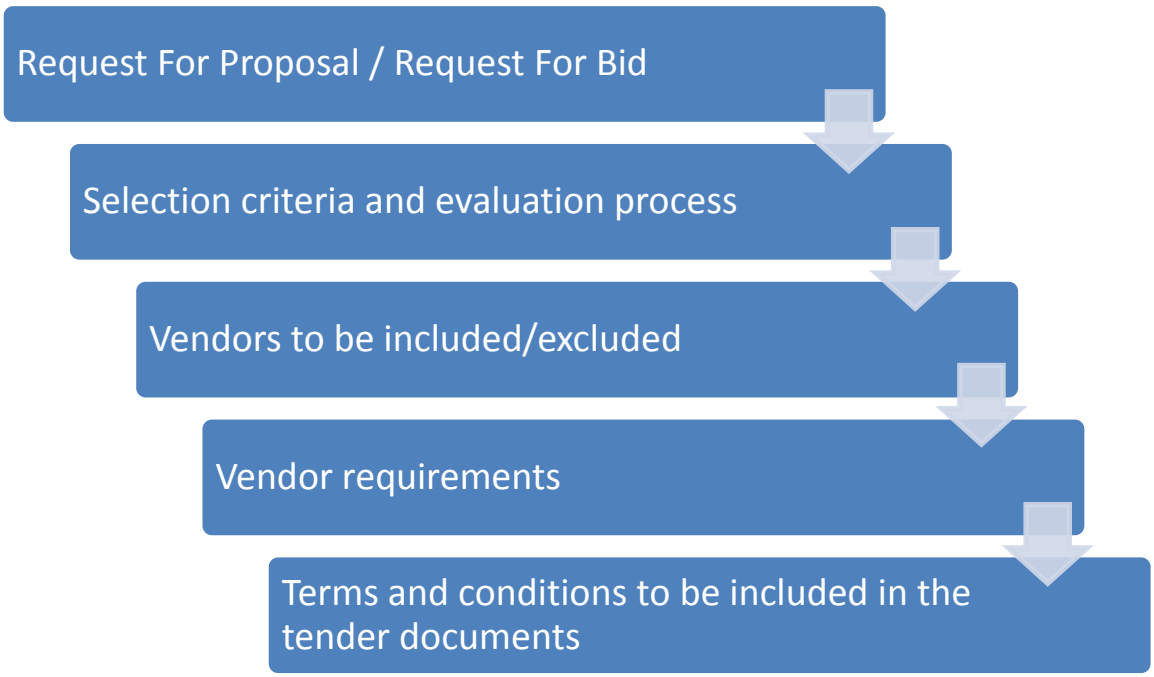
Criteria

The initial screening of vendors was aimed at getting to a short list as quickly as possible. A request for proposal (RFP) was distributed to only four vendors. CARE started with a small group of vendors, each

of whom met five key requirements:

1. Product employed current technology
2. Product was a fully integrated suite of core clinical components
3. Applications were available for inpatient, ambulatory, and outreach environments
4. Vendor demonstrated financial and management stability
5. Vendor had experience with large tertiary care and academic customers vendor requirements

TABLE 4 RFP



Request for proposal *(RFP).* The RFP consisted of 15 subject areas (Table 1). The vendors were asked to respond by including the question in their response, and by using the same numbering sequence as the RFP. This made it very easy to compare responses.

REQUIREMENT TO BE FULLFILLED BY VENDOR

The hospital asked for pricing information in an Excel spreadsheet.

In RFP, vendors should provide

Company background
Client references

1. Detailed technology system information
2. Pricing
    - License
    - Product cost
3. A functionality checklist
4. Implementation price
5. Training prices
6. Support costs
7. How long product will last
8. Hardware: Server, Utility hardware, network infrastructure.
9. Software: Application software
10. Services
11. First five year cost
12. List of products that EHR will interface with.
13. Maintenance cost

Table 2 describes the steps for the vendor selection process .

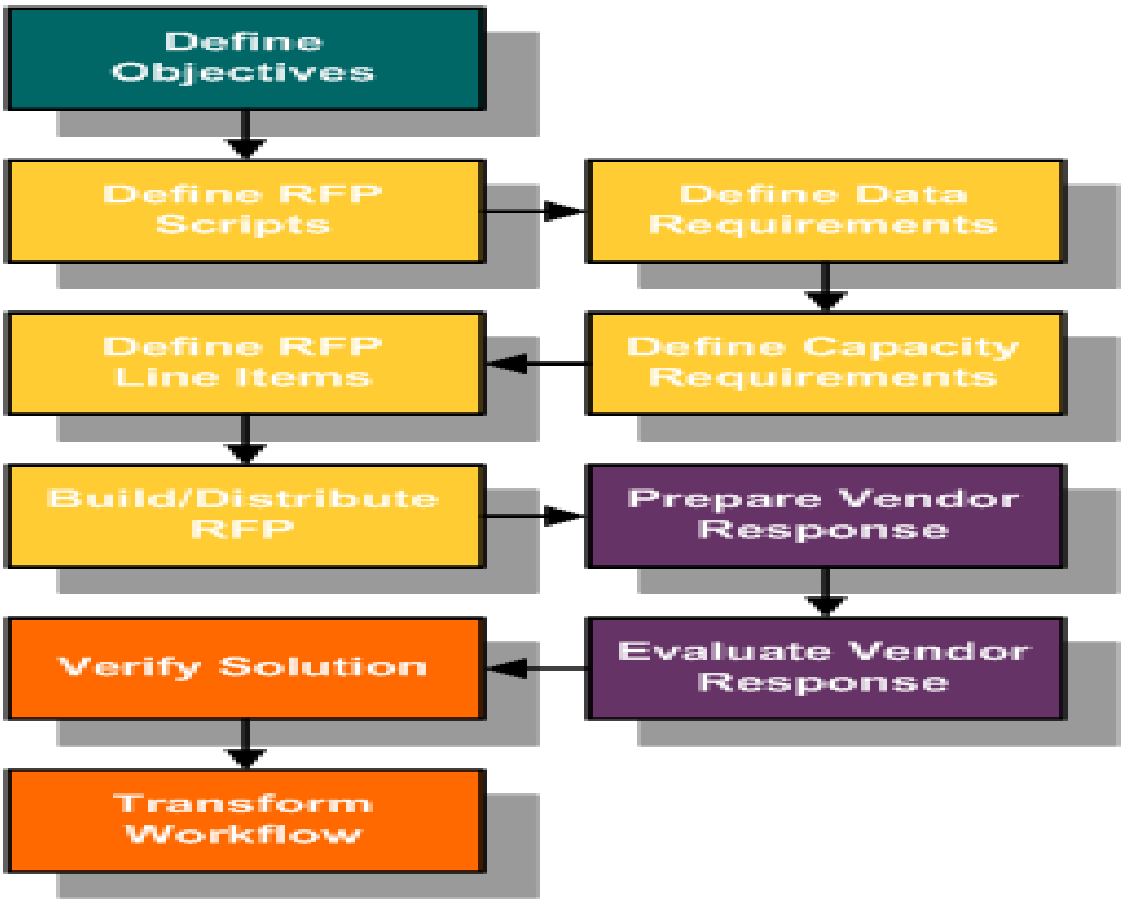


TABLE 5 WORK PROCESSES

A short list of vendors was developed using the five criteria, with the assistance of the external consultants .Each of the consultants had vendors that they felt met our criteria. By comparing

all the recommendations from all the consultants, it was fairly easy to identify the five vendors who were represented most often. A comprehensive RFP was issued early in the process.

The RFP was very directive in the format in which the vendors were asked to respond, and very directive in the time frame for turning the RFP around. The vendors did respond to the RFP in a very short period of time (six weeks), and they all responded exactly to the format and structure that was requested. In so doing, CARE's comparison of vendors' responses across proposals was facilitated. At the same time a detailed technical RFP was issued as an addendum to the original RFP. Over the course of the following months several RFP addenda were issued when fairly specific questions /issues required a lengthy

and/or written response. It was fairly easy to identify the five vendors who were represented most often.

Table 6 RFP Subject Areas

1.0 Description of System
2.0 Technical Section
3.0 Application Section
4.0 General Questions
5.0 Specifications and Warranties
6.0 Scope of License
7.0 Deliverables and Site Requirements
8.0 Implementation 9.0 Training
10.0 Support
11.0 Personnel
12.0 Preliminary Cost Estimate
13.0 Payment
14.0 Due Diligence
15.0 Contract Issues

Product Demonstrations

Three types of product demonstrations occurred. The first type of product demonstration was called a "drive-by."This was held at CARE in the employee cafeteria. Over a five-day period,each vendor had one day where they were allowed to set up in one corner of the cafeteria and essentially hold a one-vendor exhibit. The exhibits were unstructured, in that the vendors were allowed to conduct product demos, demonstrate product futures, distribute promotional materials, and display banners.

The exhibits resulted in a number of key benefits, including:

1) It allowed CARE employees to see, hear, and touch what a new system might look like, and

(2) It facilitated building a comfort level and relationship with the vendor at the start of what would be a long process. Note that these demonstrations were the vendor's first and

last unstructured sales presentations .The second type of product demonstration was a controlled on-site presentation
at CARE .

The presentations were two-day sessions. The first day was a scripted corporate presentation .CARE provided the vendor with a script, which they were required to follow. Although it allowed them to make a sales presentation, the structure and duration was similar for each vendor. This led to a very controlled and structured presentation. Interruptions were not allowed during the presentation; questions and answers were held to the end. Each presentation was repeated three times throughout the day to accommodate schedules of the invited clinical and business staff.

The components of the presentations were established to address some of the key issues in the RFP as well as focus on the key criteria. Asking the vendors similar questions in different venues allowed
for checks of internal consistency of the vendors' proposals. Key topics included vendor viability, strategic technology planning, and conformance to CARE functional requirements and objectives.

The second day of the session was the scripted clinical scenario. Several days before the session, the vendor was given a clinical scenario.

The vendor was requested to fulfill the requirements of that scenario using their current, commercially available products. The clinical scenarios were multidisciplinary. For example, it is important to note that the clinical scenarios were available to the audience during presentations to allow them to follow the script, take notes, and provide feedback to the decision team. The audience for the two-day presentation was open to a wide range of leadership.

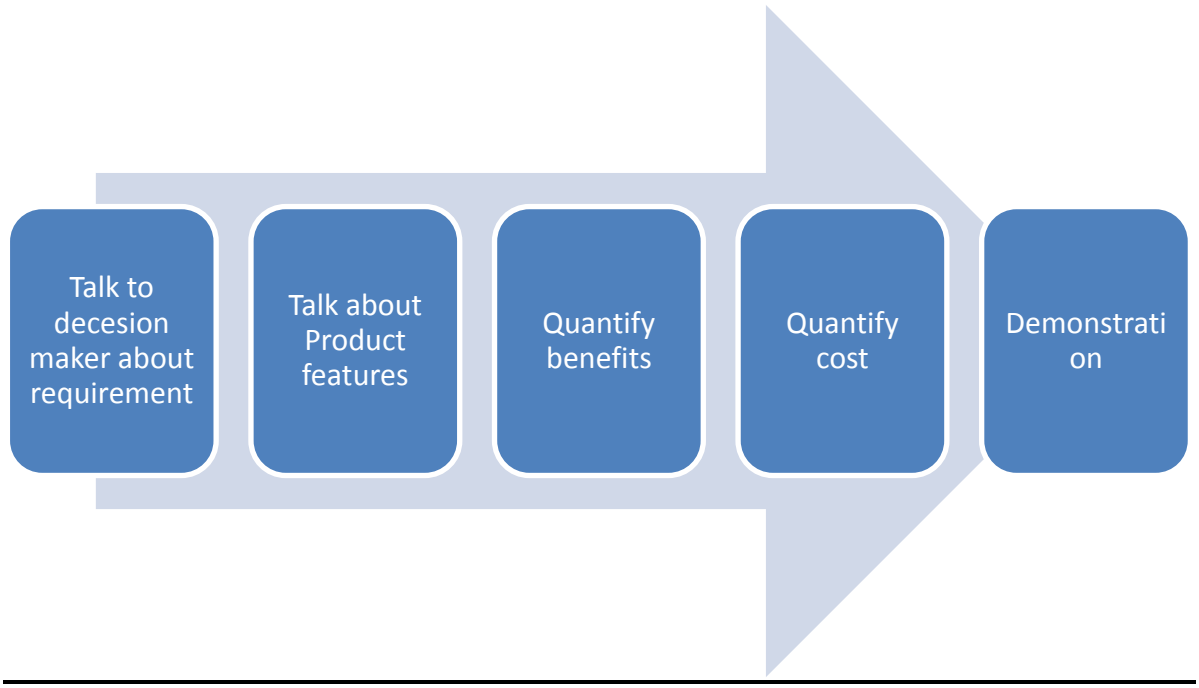
However, it was by invitation only, and not open to the CARE public. The attendees were invited by name based on their involvement in clinical systems or the selection process. Overall there were approximately 30-50 attendees at each presentation.

The third type of presentation occurred during vendor or customer site visits. These presentations were semi -structured .When the CARE decision team attended a customer site or the vendor headquarters, the vendor was provided with a list of specific questions. The vendors were instructed to respond
only to those questions .The multidisciplinary site visit team conducted the site visits. The site visit team was a smaller subset of the group that was involved in the decision-making process. It included physicians, nurses and technical people. Site visits were made to each

vendor's headquarters, plus one or two of each vendor's customers that were similar in makeup and requirements to CARE . A specific goal of the site visits was to facilitate contacts between the visiting team members and their peers at the visit site. Informal discussions at this level were quite informative as they bridged the gap between theory and practice for actual software implementation and usage.

Prior to a final recommendation, the corporate officers made a site visit to what each vendor identified as their preferred customer. The process that was undertaken to develop a recommendation was very well defined. It was a controlled process that allowed CARE to effectively evaluate the vendors on quantifiable data. A key point is that the process that was followed was very participative. It included physicians,nurses, business leadership, corporate leadership, as well as general staff and employees throughout the organization .

Table 7– The main components covered by vendors



Analytical Tools

The analytical tools that were used during the evaluation and selection process included

1. an RFP,
2. structured presentations,
3. clinical scenarios,
4. vendor assessment summary,
5. functionality analysis,

6. attributes and subattributes,
7. technology assessment,
8. cost of ownership,
9. paired comparison analysis,
10. decision analysis, and
11. risk analysis.

The value of the tools to each person of the decision team varied. For example, some decision makers focused on the quantitative decision tools, while others used the more qualitative vendor assessment summary.
Descriptions of analytical tools follow, except for the structured presentations and clinical scenarios, which were discussed in previous sections.

Functionality analysis

The functionality analysis was based on functional requirements that were most important to CARE. These clinical criteria encompassed 77 items distributed into five broad categories (Table 6,appendix). The requirements focused on workflow, process, and outcomes functionality, as opposed to specific detail features. This allowed for feature variability among the vendors while fulfilling the functional requirements.

Table 6 lists the **Overall Functionality (Appendix 4)**

Attributes and subattributes assessment

The RFP requested each vendor to self-assess their product's ability to fulfill functionality of the computer based patient record as described by the the hospital. The vendors were also requested to cross-reference the fulfillment of these attributes to a specific product in their proposal. This provided a tool for cross-vendor evaluation, and also provided documentation that can be used contractually to bind a vendor's commitments to actual functionality.

Technology assessment

A CARE technology architecture committee completed the technology assessment. They established technical criteria against which the vendors were evaluated. The assessment was done in a summary narrative .

Cost of ownership

The total cost of ownership and net present value cost analysis was done. The net present value allows for a single point comparison across vendors for total cost. Secondly, it consolidates the annual sup- port requirements, which are often difficult to compare across vendors. In addition, the estimated initial cost can be segregated fairly easily into capital and operating costs .

Vendor assessment summary

A vendor assessment summary was used as a working document for the decision team (a subset of this summary is in Table 5). It supported the individual qualitative or quantitative decision modes of each member of the team. The vendor assessment was based on a summary compilation of data that compared the two vendors. While the analysis was presented as objectively as possible, the decision process is substantially a subjective process. For instance, although the presence or absence of any given expert engine methodology is objective, the importance of its being present is a subjective judgment.

Table – 8 OVERALL TOTALS TABLE

	Number of A votes	**Number of B votes**	**Total votes (add 2 columns)**
Vendor 1	**1**	**1**	**2**
Vendor 2	**0**	**1**	**1**

4. RESULT

Based on the overall assessment Vendor 1 was selected for providing complete IT solution to CARE .

4.1 LEARNINGS

Five significant lessons were learned from the process.

1.Although there was acceptance of the evaluation criteria at the beginning of the project, it would have been beneficial to have formal corporate buy-in of the criteria right from the start. It also would have been beneficial to have the criteria ranked at the beginning .A ranked set of criteria would have allowed the decision team to focus the investigations on data where discrimination among the vendors was most important.

2. While this initiative was established as a project (with a start and an end date, milestones, project plan, and so on), it was actually a discovery process. Learning about the vendors almost always seemed to lead to more questions. The discovery process ultimately led to a much longer project. It became evident at a certain point in time that the value of new information was marginal to the decision process, and that it was necessary make a recommendation.

3. Consensus may not occur. After all is said and done, when all the rankings and analyses are completed ,there is still a substantial component of subjectivity even within the quantitative analyses.

4. The initial goal was to discriminate the best vendor from the others. Eventually the goal was expanded to identify the vendor that was least risky, given reasonable equivalence across all evaluation criteria.

5. Begin the contract development and negotiation during the sales process .This is when the vendor is willing to make commitments to gain new business. Quantify these commitments, so they can be incorporated into the final contract .The most important activity undertaken during the selection process was change management. This philosophy existed at the beginning of the project, with the expectation that the selection process be both an analysis and an education .For this reason it was a participative process, evidenced by a vendor “drive-by,” structured presentations, and extensive and open communication throughout the process .After 11 months of analysis, a vendor was selected. The next steps to be undertaken were a continuation of the efforts that were initiated during the selection process. For example, the vendor analysis included pro

forma gap analyses and needs requirements. It was important that these activities be continued and formalized during the vendor negotiations and implementation.

4.2 CHALLENGES

The slow growth/adoption of the EMR market is attributed to:

- Attitude towards IT adoption: there are often some people in any given hospital, who show reluctance in adoption of new technologies and are against system changes.
- Security and privacy issues: the patient information flowing across the system is not controlled centrally and many system users have access to it, which makes it critical to address issues of privacy, confidentiality and misuse or mishandling. These issues are challenging and critical for the key decision makers while adopting EMR .
- Transferring paper based information into electronic (EMR) format: the transition of paper-based records into electronic format is a manual and tedious process as it takes a lot of time converting each record, keeping in mind the high-level of accuracy and authenticity required.
- Long implementation time: the implementation of EMR takes a lot of time as the system is based on the key information flowing across the hospital system and involves various levels of users.
- Employing the right team: EMR implementation usually takes a very long time so it's important to have the right team of people with the right skills required to implement the system. This is to avoid any delays in implementation, which may be caused due to lack of commitment, communication issues, infrastructure issues, time management issues, etc.

CHALLENGES IN VENDOR ASSESSMENT:

1. To first answer the question as to what CARE wants if it decides to select an EMR for its hospital.
2. The vendors are the market leaders in healthcare - IBM,HP,INFOSYS,DELL.
3. Whom to select.
4. How to bring IT best practices to CARE .
5. How to achieve acceptability of the new EMR system.

CHALLENGES FOR EHR IMPLEMENTATION

One of the critical phases in the healthcare industry is change management. Many hospitals have gone for EHR but could not implement it properly because anything that is implemented has to be doctor friendly. CARE was conscious about it and took care of it from the very beginning.

Any of the products that were planned to bring in were scanned through the doctors' comments to make it customized further enhancing its usability. In the process of selection of any of the products we see a high engagement of the clinicians because we believe its not the IT vendor who uses the products its the doctor and clinician who use the product.

Therefore, adoption is the best policy of change management. While implementing the basic format of the infrastructure by the vendor, all the clinicians in CARE have been conveyed about all the information and knowledge about the products, including its usage and even a minor detail about the project. Therefore, there is no push for the IT implementation in the project, rather there is a pull from the doctors and clinicians in the process.

However, while working together in the project, the vendor in this case is is only responsible for developing the infrastructure, support and maintenance and CARE is responsible for product searching, selection and procurement.

4.3 CONCLUSION

In choosing an EMR solution, the hospital needs to carefully consider the following:

· Timing — deadlines are not very far off, especially when you realize that a phased implementation can take time from planning through full-scale deployment and ultimately meaningful use.

· Benefits— beyond the often mentioned benefits related to patient care and operational efficiencies, critical access and community hospitals stand to realize additional benefits from a complete EMR solution, such as improved retention of local patients and increased leverage in attracting new physicians.

· Benchmarks— As this document showed, community and critical access hospitals possess a significantly different set of needs compared with larger organizations. Some vendors push "one-size-fits-all" labels on their solutions, while others cater to narrow subsets within the hospital universe. By applying key benchmarks to your decision process, you can ultimately arrive at the choice that aligns with your immediate and long-term best interests.

5.REFERENCES

Minal Thakkar ,Diane C Davis. (2006) “Risks, Barriers, and Benefits of EHR Systems: A Comparative Study Based on Size of Hospital” , PubMed, 24:1, 2-9.

Carolyn P. Hartley, Edward D. Jones III, Newt Gingrich. (Feb. 28, 2005) “ EHR Implementation: A Step-by-Step Guide for the Medical Practice” ,American Medical Association, 24:2, 1-5

Jerome Carter. (Paperback - Mar. 15,2008) Electronic Health Records, (2nd Edition), London, DP Publications Ltd.

http://en.wikipedia.org/wiki/Perot_Systems

www.ameinfo.com/155680.html

en.wikipedia.org/wiki/VistA

www.informed-inc.net/.../Eight_Steps_for_a_Successful_EMR_Implementation.pdf

www.aphl.org/aphlprograms/global/.../LISQuickStartGuide.pdf

issuu.com/ehealth_magazine/docs/ehealth_september_2009_issue

en.wikipedia.org/wiki/Operating_system

www.ncbi.nlm.nih.gov

6. APPENDIX

APPENDIX 1

Criteria for Evaluation of Electronic Medical Record System Vendors

I. Ability to execute (due diligence)	**II. Functionality**
1. Vendor viability — R&D investment 2. Growth strategy 3. Revenue $M 4. Net income $M 5. 6. Total assets 7. Total liabilities 8. Number of installations similar to proposed solution 9. Quality of project plan for new product development 10. Quality of project development methodology	1. Expert engine 2. Medical dictionary 3. Research 4. CARE nursing group — overall assessment 5. CARE physician group —overall assessment

III.Current technology architecture

1. Hardware
2. Software
3. Network
4. Personnel
5. Database
6. Directory services
7. Automation monitoring
8. Middleware
9. Internet/intranet
10. Maintenance and support
11. Planning
12. Implementation
13. Security
14. Reliability/performance
15. Manageability
16. Interoperability
17. EMPI
18. HIPAA

IV. Company vision for future technology architecture

1. Clinical and financials
2. Acute and ambulatory products
3. Core clinical products
4. Departmental products
5. Primary vision

V. Service and support

1. 3rd party product works with vendor product
2. Enterprise commitment to technology
3. Executives interested in you
4. Good contracting experience
5. Helps your job performance
6. Lived up to expectations
7. Product works as promoted
8. Quality of implementation
9. Quality of interface services
10. Quality of telephone support
11. Quality of training
12. Quality: money's worth
13. Service: proactive
14. Vendor is improving

VI. Relationship

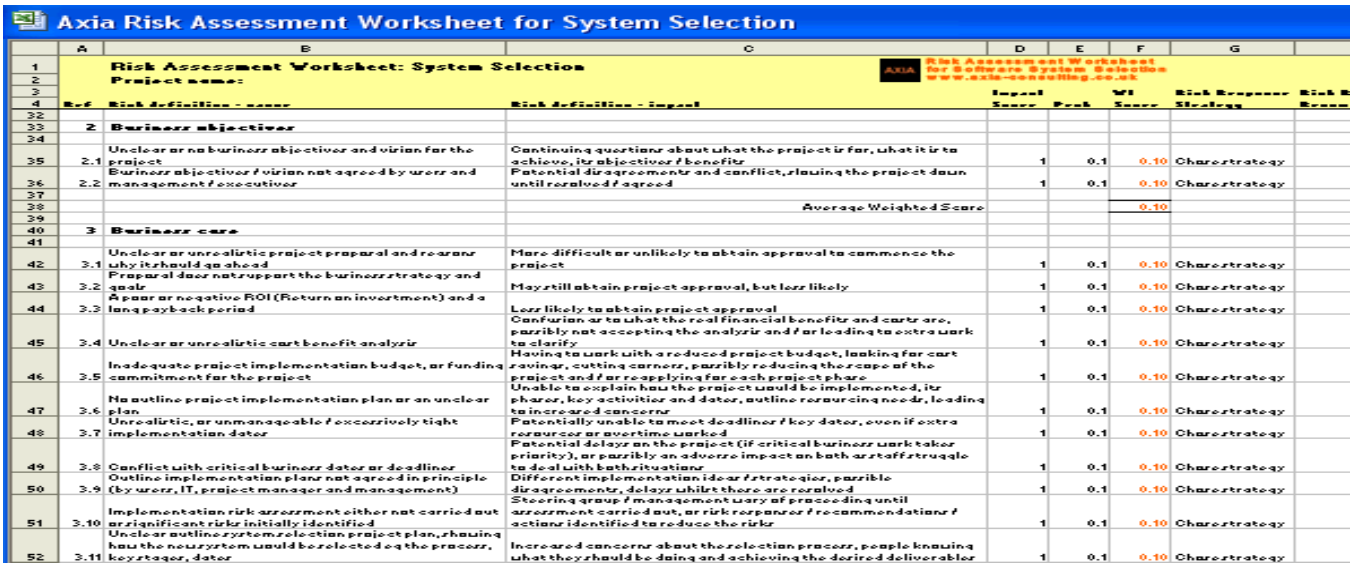
1. Risk sharing
2. Development relationship
3. Pricing
4. Research
5. Strategy development
6. Communication
7. Public relations

VII.Pricing and products

1. Purchase core clinicals
2. Average annual operating expense
3. ADT/Registration / (5 year maint.)
4. Web access — affiliates / (5 year maint.)
5. Web access — non-affiliates
6. Web access — community (patient)
7. Professional billing
8. Hospital billing
9. Pharmacy
10. OR scheduling
11. ICU
12. Emergency
13. Cardiology
14. HIM chart tracking
15. Call center/nurse triage

Risk Assessment Worksheet for System Selection

Image of the Risk Assessment Worksheet - for System Selection.



Axia Risk Assessment Worksheet for System Selection

	A	B	C	D	E	F	G
1		**Risk Assessment Worksheet: System Selection**					
2		**Project name:**					
3							
4	**Ref**	**Risk definition - cause**	**Risk definition - impact**	**Impact Score**	**Prob**	**WI Score**	**Risk Response Strategy**
32							
33	**2**	**Business objectives**					
34							
35	2.1	Unclear or no business objectives and vision for the project	Continuing questions about what the project is for, what it is to achieve, its objectives / benefits	1	0.1	0.10	Share strategy
36	2.2	Business objectives / vision not agreed by users and management / executives	Potential disagreements and conflict, slowing the project down until resolved / agreed	1	0.1	0.10	Share strategy
37							
38			Average Weighted Score			0.10	
39							
40	**3**	**Business case**					
41							
42	3.1	Unclear or unrealistic project proposal and reasons why it should go ahead	More difficult or unlikely to obtain approval to commence the project	1	0.1	0.10	Share strategy
43	3.2	Proposal does not support the business strategy and goals	May still obtain project approval, but less likely	1	0.1	0.10	Share strategy
44	3.3	A poor or negative ROI (Return on investment) and a long payback period	Less likely to obtain project approval	1	0.1	0.10	Share strategy
45	3.4	Unclear or unrealistic cost benefit analysis	Confusion as to what the real financial benefits and costs are, possibly not accepting the analysis and / or leading to extra work to clarify	1	0.1	0.10	Share strategy
46	3.5	Inadequate project implementation budget, or funding commitment for the project	Having to work with a reduced project budget, looking for cost savings, cutting corners, possibly reducing the scope of the project and / or re-applying for each project phase	1	0.1	0.10	Share strategy
47	3.6	No outline project implementation plan or an unclear plan	Unable to explain how the project would be implemented, its phases, key activities and dates, outline resourcing needs, leading to increased concerns	1	0.1	0.10	Share strategy
48	3.7	Unrealistic, or unmanageable / excessively tight implementation dates	Potentially unable to meet deadlines / key dates, even if extra resources or overtime worked	1	0.1	0.10	Share strategy
49	3.8	Conflict with critical business dates or deadlines	Potential delays on the project (if critical business work taken priority), or possibly an adverse impact on both or staff struggle to deal with both situations	1	0.1	0.10	Share strategy
50	3.9	Outline implementation plans not agreed in principle (by users, IT, project manager and management)	Different implementation ideas / strategies, possible disagreements, delays whilst these are resolved	1	0.1	0.10	Share strategy
51	3.10	Implementation risk assessment either not carried out or significant risks initially identified	Steering group / management wary of proceeding until assessment carried out, or risk responses / recommendations / actions identified to reduce the risks	1	0.1	0.10	Share strategy
52	3.11	Unclear outline system selection project plan, showing how the new system would be selected eg the process, key stages, dates	Increased concerns about the selection process, people knowing what they should be doing and achieving the desired deliverables	1	0.1	0.10	Share strategy

Appendix 3

Software Vendor Evaluation Questions

Non-functional evaluation questions to ask a software vendor - before you become their next customer

Vendor background

When was the vendor business founded? How has the business grown? – By organic growth, or by merging with or taking over other businesses? Has it been the subject of takeovers itself? If so, are the original founders / team still involved and what has happened to the original software range(s)?

Current business structure

What is the current ownership of the vendor business? – Is it an independent company or part of a larger group? If so, do they have a justification for this?

Vendor financials

Have you reviewed / analysed the vendor's published annual accounts – for the current and previous few years? Do the accounts provide a clear explanation of what's going on in the business?

For instance - what is the annual revenue (turnover) for the latest year / latest quarter and for previous years? What % of revenue is from software versus services? What are the revenue trends – growing, stable or shrinking?

Similarly, what is the annual expenditure for the latest and previous years? How much expenditure was spent on support, research & development, marketing and administration ($ and % mix)? And how does this compare with other vendors? What are the expenditure trends / issues?

How profitable is the vendor – and what is the trend for the last few years?

Does the balance sheet indicate excessive borrowing or cash flow issues? What do the trends and financial ratios from the annual accounts tell you? Is the vendor business financially sound and stable, or is it struggling?

Does each set of accounts have a 'clean audit'?

Vendor's employees

How many employees does the vendor have? And how many are working in support, research & development versus sales, marketing and administration? Do one or more areas appear to be over or under resourced?

Are there any trends, such as staff numbers increasing or reducing, and if so, in which areas? What is the staff turnover?

What mention of employee qualifications, skills, experience, training is made by the vendor?

How many sales and support staff are employed in your geographical location?

Vendor's customers

Who are the vendor's customers? What industries are they in? How many customers does the vendor have in your industry? What is the average or range of customer size? How many software users do they each

have, typically?

How many customers does the vendor have in total? How many new customers did the vendor have in the last year?

What modules have customers taken? How many are on the latest software version? How many are upgrading?

How many customers are willing to provide references, or respond to enquiries, or even host a site visit for potential new customers?

Vendor reputation

What is the vendor reputation and track record within the industry? How do the analysts rate the vendor, software and services?

What is being said about the vendors, their software and services? What do published articles or reviews (either online or off line) say? Are there useful case studies eg on the vendor or other websites?

What information is being published about the vendor on social networks eg Facebook, LinkedIn, Twitter? Have you posted a question and awaited feedback? Have you searched the major search engines with terms such as: vendor name or software, plus ‘is’ or ‘problem’ or your concern?

Quality standards and accreditations

What quality standards and accreditations has the vendor has achieved eg ISO 9001:2000? Has the vendor won any business or software awards eg software of the year?

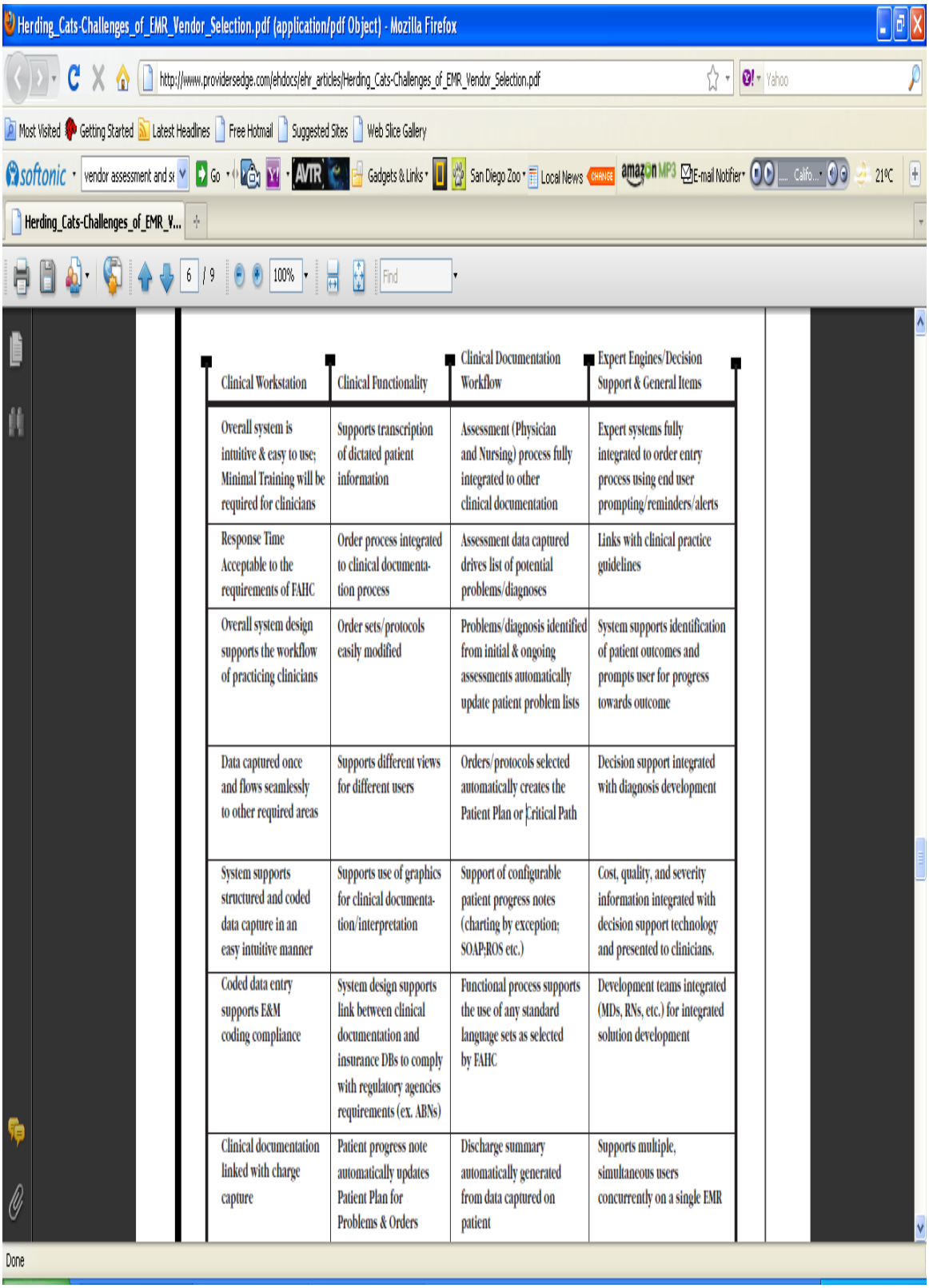
Strengths and weaknesses

What are the vendor’s strengths and weaknesses from your point of view? How do they compare with their competitors? And how do the vendors view their strengths and weaknesses?

Future direction

What are the vendor’s future business and software plans and direction? Where is it heading? And is this in line with where you want your business to go?

Appendix 4 – Table 6



Clinical Workstation	Clinical Functionality	Clinical Documentation Workflow	Expert Engines/Decision Support & General Items
Overall system is intuitive & easy to use; Minimal Training will be required for clinicians	Supports transcription of dictated patient information	Assessment (Physician and Nursing) process fully integrated to other clinical documentation	Expert systems fully integrated to order entry process using end user prompting/reminders/alerts
Response Time Acceptable to the requirements of FAHC	Order process integrated to clinical documentation process	Assessment data captured drives list of potential problems/diagnoses	Links with clinical practice guidelines
Overall system design supports the workflow of practicing clinicians	Order sets/protocols easily modified	Problems/diagnosis identified from initial & ongoing assessments automatically update patient problem lists	System supports identification of patient outcomes and prompts user for progress towards outcome
Data captured once and flows seamlessly to other required areas	Supports different views for different users	Orders/protocols selected automatically creates the Patient Plan or Critical Path	Decision support integrated with diagnosis development
System supports structured and coded data capture in an easy intuitive manner	Supports use of graphics for clinical documentation/interpretation	Support of configurable patient progress notes (charting by exception; SOAP/ROS etc.)	Cost, quality, and severity information integrated with decision support technology and presented to clinicians.
Coded data entry supports E&M coding compliance	System design supports link between clinical documentation and insurance DBs to comply with regulatory agencies requirements (ex. ABNs)	Functional process supports the use of any standard language sets as selected by FAHC	Development teams integrated (MDs, RNs, etc.) for integrated solution development
Clinical documentation linked with charge capture	Patient progress note automatically updates Patient Plan for Problems & Orders	Discharge summary automatically generated from data captured on patient	Supports multiple, simultaneous users concurrently on a single EMR