

Electronic Health Record Architecture for Medical Practice

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Executive Summary

Medical Practice requires precise, accurate, and updated document management procedures that are often difficult and expensive to implement manually. There is always a chance of uncertainty, redundancy, and human error when maintained without any optimal and efficient system. Therefore, the concept of [Electronic Health Record System](#) (EHR) implements the use of Document Management Software that is capable of high levels of efficiency, optimization, and management of a large number of documentation. Based on the concept of automated EHR, the paper will present an overview of the architectural design and infrastructure of the EHR that is customized for the medical record practice. The system will be capable of creating an artificially intelligent knowledge base for the data extracted from scientific papers and experienced medical personal records. In order to evaluate the current level of efficiency of available EHR solutions for hospitals and medical organizations.

Introduction

Enterprise Information Architecture (EIA) is a plan for how an association accomplishes its present and future business targets utilizing information innovation (IT).

It analyzes the key business, information, application, and innovation methodologies and their effect on business capacities [1]. The Zachman Framework is presumably the most perceived and mainstream way to deal with enterprise displaying [2]. The framework is portrayed as an architecture that speaks to the information frameworks' antiquities, giving methods for guaranteeing that principles for making the information condition exist and that they are suitably incorporated.

With the expanding size and multifaceted nature of the usage of information frameworks, it is important to utilize some intelligent development for characterizing and controlling the interfaces and reconciliation of the majority of the parts of the framework [3]. Along these lines, it is important for any enterprise to characterize enterprise information architecture to empower an incorporated vision and worldwide point of view of the enterprise information assets, to empower the revelation and end of redundancy in the business process, to have information frameworks that reflect shared objectives and performance measures for all chiefs, to energize collaboration inside an enterprise; and to end up the extension between the business and specialized areas [1].

Enterprise Information Architecture Reference Architecture (EIA RA)

The variables that add to EIA hone were distinguished. Top administration bolster is an imperative factor recognized by the respondents for the accomplishment of EIA execution. This is firmly identified with satisfactory spending assignment, which is the following contributing element distinguished. Respondents have been reliable in stressing the significance of financing for the EIA venture, which again and again has been ignored as the task is thought to be a piece of the IT acquisition process.

The following contributing component is the presence of a formal structure for the EIA venture administration and the presence of legitimate documentation techniques. Great undertaking administration will help guarantee opportune task finish and capacity to accomplish ideal human and monetary resources.

Another contributing variable to EIA rehearse is a positive workplace that encourages joint effort between work gatherings, sufficient offices and infrastructure for IT reception, steady and reliable strategies, and a domain that encourages simplicity of work.

Human resources has likewise been recognized as a vital factor for EIA hone. Staff turnover, bumbling IT staff, absence of client duty, lack of ability to do EIA, indistinct client necessities, the strife of comprehension between EIA group and administration, and deficient staff make up the human resource factor that should be addressed before actualizing EIA.

Other contributing variables which similarly essential are climate support inventiveness and imaginativeness; there is a requirement for administration and clients to be imaginative and creative in contributing thoughts with the goal that new procedures, items, and administrations can be made to expand profitability and turn out to be more focused. Sufficient time and preparation, technology affected the investigation, and IT arranging was likewise distinguished as contributing components.

Information Management and Integration

Medical record libraries are the basic, mid-archived of all paper-built medical records archived with respect to hospital layout. Based on the extent of the hospital, the number of records saved in them can run into countless thousands. In addition to consuming an extensive investment, the history files need a lot of assets to manage them, regularly expecting to be in full operation 24 hours every day and 7 days a week. EHR makes use of the latest Information technology solutions that enhance its capacity and running abilities. Generally, a manual operator will not be vigilant and active 24/7 yet the cost of recruiting several operators will enhance the cost as well. On the other hand, the EHR will be able to run 24/7 without any reduction in efficiency and management.

In general, the aforementioned library systems are far from proficient. However, the expenses

included saving and operating massive paper records, it is just about difficult to offer their substance to more than one individual around then or to access records remotely. In most hospitals, insurance of the records on the occasion of a fiery breakout, surge, or document misfortune is a critical and unattended risk, as well.

Assuming that accurate, state-of-the-art patient-qualified information can't be found instantly, this has an immediate bearing on the nature of patient forethought, with probably genuine suggestions. The 2000 Audit Commission report (Brook, 2010) discovered that an expected 1,000 deaths every twelve months are brought on by medical failures -above all, outstandingly by clinicians not having the right patient informative content for the purpose of consideration. It is figured that advanced computerized systems could recover 75% of the aforementioned lives. (Brook, 2010)

Proposed Solution

In order to reduce the stress, strain, and pressure exerted in the medical record maintenance systems due to the extensive load of manual work, the IT-based solution for the EHR or the EHR is proposed. The EHR will be highly efficient, precise, and effective in reducing the difficulty of healthcare facilities and will help them provide better health services. EHR will enhance the efficiency of the system and will reduce the need for manual operators who tend to have a higher risk of negligence and inefficiency in Data management.

- Detailed Description of EHR and its Mechanism

In the last few years, EHR has become crucial for many healthcare organizations. The larger part of conglomerations needs to gain entrance to, and counsel stored information much of the time. Therefore, efficiency necessities must be recognized by the EHRs with a specific end goal to provide quick access to the establishment. Moreover, documents need to pass from one individual to another in many of the aforementioned conglomerations. Therefore, EHR must define a set of tenets for this process. It is known as the workflow process.

EHR is concerned with the automation of procedures where documents, information, or undertakings are passed between members, emulating a defined set of tenets to realize or give to a, for the most part, business objective; the mechanized help or automation of a business process, in entire or part. EHRs might be classified in some sort, relying on the nature and aspects of the process (Fischer, 2003). Communitarian EHR automates business processes where an assembly of individuals takes part to accomplish a regular objective. This sort of business process includes a chain of exercises where the documents are processed and transformed until that objective is accomplished. As the problem of constructing a store about confounded and nitty gritty medical databases fits superbly in this model, This paper is based on the architecture of the system in this model.

Figure 1 shows the whole system architecture. This paper emulated the suggestions of the EIA RA, an ordinarily acknowledged framework for the design and growth of workflow management systems,

planned to accommodate the assortment of useful techniques and operational situations that describe this technology. In this manner, in spite of the fact that This paper utilized this architecture for the usage of a specific system, it could be utilized as a part of different situations and scenarios.



Fig 1: Generic Architecture of EHR (Alur et al., 2003)

Basic Characteristics of the Efficient EHR

Since medical and healthcare facilities are highly sensitive about the privacy and security of private and confidential data along with efficient management, the EHR appears to be one of the most suitable choices. The reason for stating so is that it offers integrated and automated security and management features. Some of those basic and extended features are described briefly:

- **Security.** This capacity controls which users have access to particular information. Any system that you utilize must have the capacity to protect confidential records as demarcated by the Freedom of Information Act.
- **Modification.** The EEHR might as well permit users to add documents to the system and designate a document as an official record. It might as well additionally automatically allot the correct version designation.
- **Metadata.** The EEHR might as well permit you to catch and utilize the metadata appropriate for your channel.
- **Records Keeping.** EEHR systems don't dependably incorporate the capability to perform records management capacities. An EHR must have the capacity to provide secure access, support the record's context inside the document sequence, and automate the execution of attitude instructions for all records in the system.
- **Storage.** This capacity will permit you to store records inside the EHR or to halfway manage your subordinate storage system.
- **Text search.** This capacity permits users to search every saying in the whole document or a specified gathering of documents. Different systems search just metadata.
- **Hypertext links.** Certain EHRs will provide hypertext links from one document to another to help go and search right around identified documents.
- **Auto conversion.** Certain EHRs will automatically convert one document arrangement to another when the index is designated as a record.
- **Extended Document management.** Certain EHRs manage compound records superior to others. Compound records are single documents that contain various components (e.g., content, photos, motion pictures, hypertext links).

Utilization of EHR in the Medical Field

The field of health care and medical facilities is one of the most sensitive yet extended organizations that have to deal with a large amount of sensitive and highly unique data. Since they tend to deal with human health, there is rarely any chance of mistakes, inefficiency, or ignorance. Therefore, the EHR proves to be one of the most significant solutions for document management. Several vendors and producers have been developing the EHR; however, they tend to have certain complexities that reduce their efficiency. In a general medical EHR, one should always look out for usability, a user-friendly interface, database capacity and knowledge management abilities, security options, and automated update features. Based on these measures and metrics, one of the most efficient vendors that has created a customized EHR specifically for the field of medical and health sciences is Samsung. The respective section will briefly explain the basic features of the EHR created by this specific vendor.

Samsung SmarThru™ Workflow is a server-based document system inserted in Samsung printing devices that streamlines document catching, processing, and tracking (“SmarThru”). This workflow result assists in supporting the social insurance workforce in patient electronic document documenting, search, and dissemination while recovering profitable assets (“SmarThru”).

Converting paper-based documents to electronic organizations lessens printing, storage, and management costs and likewise assists in improving productivity. Unified document management results improve correspondences by having staff in numerous areas ready to gain entrance to the documents, and diminish manual work previously needed to sort through, document, and recover paper documentation (“SmarThru”).

The Samsung SmarThru offers a unique feature and technology that has made it more credible, reliable, and efficient in not only document management but also document imaging for the ease of inputting accurate data and then parsing it according to the needs and requirements of the health care facility. Some of these special features include (“SmarThru”):

- Zone OCR;
- Barcode OCR;
- Fax Caller ID;
- Text Digitization with OCR;
- Metadata Scan;
- XML Exporter.

These OCR characteristics are highly efficient in capturing the data as well as the metadata and then converting them into machine-understandable, secure records that can be printed, faxed, and analyzed in a personalized manner by the concerned authorities and authorized personnel only.

Conclusion

The EIA Standards Process is an important component of the EIA RA (Figure 2). To begin with, there could be an exploratory stage in which thoughts are traded and trial/model/technology exhibition exercises are led. Then again, new or refreshed principles might be proposed through different instruments. In the event that a proposed standard is judged deserving of further thought since it bolsters the vision, guideline, and vital target articulations, it is gone through a Request process and utilized effectively.



Figure 2: EIA RA Standard Process

Recommendations

This paper has portrayed an abnormal state framework for an EIA and the help association and procedures that this paper believes are fitting for some associations, especially for those with decentralized, self-ruling cultures and association structures. Moreover, the key components include catching the specifications in succinct, straightforward, and communicating vision and guideline articulations, recognizing key EIA RA components and their interrelationships in a notable outline, and indicating a far-reaching association structure and procedures for the EIA RA's advancement, usage, bolster and continuous development.

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