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Health Information Technology Strategic Planning Alignment in Saudi Hospitals: A Historical Perspective

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Abstract.
Background: The healthcare industry, not only in Saudi Arabia and the Middle East but also worldwide, has become increasingly reliant upon information and communication technology in order to achieve certain objectives such as enhancing the quality of healthcare and reducing the time and cost for healthcare delivery. To encourage efforts in this field, a Middle East excellence award in the use of electronic health was introduced in the Arab Health conference, held in Dubai, in 2010. The National Guard Health Affairs (NGHA), Saudi Arabia, was the winner of this award.
Objective: To closely examine the work of the NGHA in the area of Health information technology that led to its excellence award recognition. The article reviews and summarizes the major information technology (IT) projects within NGHA during the study period (January 1998- November 2011). This represents more than thirteen years of data and knowledge. The study pays a special attention to the IT strategic plan developed in 1999 and examines how the strategic plan was followed.
Methods: An action case study approach was used in this study due to the fact that the researcher was a participant in the project management group of all IT projects at NGHA during the study period. Data collection methods included: semi-structured interviews, meeting minutes, and external reviews. The researcher used these documents as a reference to examine how closely the IT strategic plan was followed. The researcher mapped each of the major IT project within NGHA with one strategic goal of the IT strategic plan.
Results: The research includes ten key lessons in the following areas: IT vision, IT projects risks, IT departments' roles, IT infrastructure, project management, adequate training, systems integration, healthcare analytics, political situation impacts, and the fit between international solutions and local requirements.
Conclusion: In spite of the potential benefits that health IT offers to the healthcare industry, the failure rate in health IT-related projects are extremely high. The lessons learned in the implementation of such projects must be shared across all of healthcare, both locally and internationally, so that success can be replicated and failures avoided.

Keywords. E-Health; Health Information Technology; IT strategic planning; Strategies Alignment; Health Information systems; and Health Studies.

I. Introduction

More and more healthcare organizations have embarked on Information Technology (IT) to improve outcomes, reduce medication errors, increase healthcare efficiency, and eliminate unnecessary costs [1]. IT in healthcare has expanded from primarily administration and financial oriented to more clinically oriented systems. The health IT field has received a renewed interest after the United States passed the American Recovery and Reinvestment Act (ARRA) in 2009 which grants substantial financial incentives to healthcare providers for using health IT if they can demonstrate "meaningful use" of electronic health records, which includes structured documentation and sharing of clinical information within and across organizations for patient care, for public health purposes, and quality of care reporting [2].

In the Saudi health sector, the utilization of IT has increased. Although some health organizations are expanding their IT infrastructure and applications, there are however variations among these organizations with respect to the expanding rate and reliance on IT. Unfortunately, the majority of Saudi hospitals are in their early stages of adopting IT, and very few health organizations are in the advances stages. [1].

The adoption of e-health is of a particular importance in Saudi Arabia for the following reasons [3]:

- The majority of hospitals and medical centers in Saudi Arabia still record patient information on paper.
- The amount of health information is increasing. However, different health sectors use disparate systems with little interoperability between these systems which created non-connected islands of information.
- Most healthcare information systems have historically organized the delivery of healthcare around institutions and not around patients. As a result, most of the existing information systems are mostly of administrative nature rather than patient-care focus.

The growth rate of Saudi population is one of the highest in the world which dictates the proper utilization of resources. The use of IT is essential to achieve that objective.

Information Systems (IS) projects failure are very common in spite of their advantages [4]. Only 32 per cent of IS project succeed (delivered on time, on budget, with required features) according to a Standish Group study [4, 5]. It is estimated that around 44 per cent of IS projects partially fail and around 24 per cent are total failures and abandoned. The failure rate is even worse in the public sector reaching around 84 per cent [4, 6]. Some of the reasons for IS projects failure include: poor project management, insufficient understanding of the technology and its limitation, and the lack of methods, skills and tools required for selecting the right portfolio of IT projects

that match the vision and strategies of the organization. Some studies have shown that the lack of alignment between IT and business strategies is one of the major reasons why IT projects fail [7]. Such alignment can help organizations by maximizing the IT value, achieving competitive advantage through IT, and providing vision and direction [8]. However, the alignment of IT and business strategies requires mutual understanding and a shared vision among business and IT executives [9].

The alignment of IT and business in healthcare is especially critical because of the numerous information systems required to be implemented in healthcare. However, insufficient research has investigated how health organizations overcome the challenge of deciding on the investments in systems that will actually support their objectives and strategies [10].

The purpose of this article is to closely examine the health IT-related projects in NGHA, a leading health organization in the area of health IT. The article summarizes all the IT major efforts within NGHA from the period of January 1998 till November 2011 paying more attention on the IT strategic planning activity that started in NGHA in January 1999. Moreover, this article closely monitors how the IT strategic plan was executed, giving special emphasis on the value of the strategic alignment between IT and business. The article also draws some lessons learned from this experience as the author believes that this research is important due to a serious lack of literature addressing this subject within the health informatics literature, in general, and more specifically within the context of Saudi Arabia and developing countries.

II. Background

The study was conducted within the National Guard Health Affairs (NGHA), King Abdulaziz Medical City, Riyadh, Kingdom of Saudi Arabia. NGHA is a leading health organization that provides a modern medical care to all National Guard employees and their families. In December 2009, NGHA received the Joint Commission International Accreditation Gold seal of approval.

Under the umbrella of NGHA, there are four hospitals and sixty primary and secondary health centers around the Kingdom having 2000 in-patient beds in total. NGHA serves more than 2.5 million out-patients and around 60,000 in-patients annually. NGHA is organized in three regions with the Eastern Region having two hospitals.

NGHA management has recognized the importance of IT early in the year 1999 by developing the first formal IT strategic plan. Since then, NGHA has successfully implemented numerous information systems such as, electronic medical record (EMR) system, enterprise resource planning (ERP) system, picture archiving and communication system (PACS), Lab information system (LIS) and office automation system. These systems run on a very robust IT infrastructure. As a result of this achievement, NGHA received the Middle East excellence award in electronic health records during Arab Health conference in 2010.

III. Methodology

A. Research Methodology

An action case study approach was selected as an appropriate method. An action case study examines a phenomenon in its natural setting with the researcher acting as a participatory agent within the research project [11, 12]. It uses data collection and analysis methods similar to those used in qualitative case studies. The major difference between action case and case studies is the role of the researcher, who is a participant within the group in the action case. This research method has been used primarily in information system research. To ensure rigor, the action case researcher provides an account of the research that includes role of the researcher, the existing situation, and provide a section on lessons learned [11].

B. Researchers Role

The researcher was a participant in the project management group of all the IT projects implemented at NGHA since 1998 including the IT strategic planning project in 1999. The researcher did not direct the strategic planning activities, but was a participant in the strategic planning process. The researcher participated in 2 strategic planning sessions from 1998 to 2010 and was involved in their implementation.

C. Data Collection and Analysis

Data collection methods included semi-structured interviews with participants, project documents, external reviewers' reviews, and meetings minutes from January 1998 to November 2011.

1. Interviews

Eight senior were interviewed by the researcher in various department within NGHA that included: network infrastructure, ERP, EMR, PACS, Knowledge Management and Data Warehousing, Corporate Data Center, Office Automation, and the LIS. The purpose of the semi-structured interviews was to gain insights into their experiences with the IT strategic plan development and implementation and to understand the challenges faced as a result of the information systems implementations and operations. On average, each interview lasted between 90 and 120 minutes. The interviews were not recorded but detailed notes on each conversation were captured.

2. Meeting Minutes

Meeting minutes from 1998-2011 for all IT departmental meetings related to the IT strategic planning and the related IT projects were reviewed. There were a total of 135 meeting minutes.

3. Project Document

The researcher reviewed all the project management documents for the major IT projects including the IT strategic planning project. These documents included: projects charters, projects communication plans, projects time plans, projects risk plans, projects cost plans, projects escalation plans, and projects closure documents.

4. External Reviews

The researcher reviewed all the external reviews conducted during the study period (1998-2011). The first external review was conducted early in 1998 by two consultants from a local university with the scope to review the existing IT direction in NGHA at that time. The second external review was done by an international reviewer who was tasked to help draft the IT strategic plan in 1999. The third external review was conducted in 2006 to check the validity of the strategic plan and check its alignment with the business strategy. The fourth one was done in 2010 to review the future IT governance for NGHA. The fifth review was conducted in late 2010 to review the progress of the data warehousing project.

To provide an overall view of the study, the initial data analysis consisted of a detailed review of program documents, meeting notes, external reviews and meeting minutes. The researcher used these documents as a reference to examine how closely the IT strategic plan was followed. The researcher mapped each of the major IT project within NGHA with one strategic goal of the IT strategic plan and tried to examine the degree of alignment between the strategic goals and business using the various data sources.

D. Conceptual Framework

Based on the review of the data, the researcher developed a conceptual framework to illustrate the NGHA process used to implement its information systems as shown in Figure 1. The IT process consists of two major phases: the IT visioning phase and the achieving of IT vision phase.

In the IT visioning phase, NGHA defined the NGHA strategies and the aligned IT strategies. In this phase, the IT steering committee played an important role to align the IT strategies with the business strategies. The main output of this step was the NGHA IT strategic goals.

The achieving of the IT vision phase consisted of four major steps:

1. Establishment of the Information systems and Informatics department.
2. Matching vision step is concerned with the fit between an IT strategy identified in the visioning phase and the IT project proposed.
3. The Deployment step.
4. The evaluation and improvement phase.

Finally, after the implementation of an IT project, the list of benefits and lessons learned were fed back to the IT visioning phase which is indicated by the feedback arrow shown in figure 1.

IV. Results

A. IT visioning phase

In order to develop its first IT strategic plan, NGHA formed a corporate wide IT steering committee, chaired by the COO in 1998. The steering committee has been

involved with the governance of IT on an ongoing basis. The committee included membership of Executive Directors (EDs) of the medical services and operations from all the three NGHA regions, Director of quality services, the director of communication, the director of internal audit, and the ED of information systems and informatics. The main charges of the ITSC included:

- Developing an IT strategic plan.
- Prioritizing the activities designated in the strategic plan and establishing a schedule for their performance.
- Providing annual updates to the IT project prioritization and budget allocation processes.
- Serving as the approval body for system selection, justification, and acquisition.
- Recommending specific NGHA IT investment targets for both capital and operating budgets.

The IT steering committee embarked on an IT strategic planning process, led by an international expert firm as an external support. The work on IT strategic planning started in January 1999 and was concluded in June 1999. The steering committee allocated a five-year budget to execute the plan which was scheduled to start for implementation in January 2000 as NGHA was busy working on the Y2K problem. Upon the review of the plan in December 2005, the IT strategic plan was extended to December 2010.

The main objective of the IT Strategic Plan was to guide the IT activities and investments of NGHA over the years following the plan. It was closely integrated with NGHA strategic initiatives and business directions and provided the opportunity to use IT as a tool to enable healthcare integration as well as to deliver information as a strategic resource.

The NGHA IT Strategic Plan was structured upon the Component Alignment Model (CAM) which consisted of seven components [13]: external environment, emerging information technologies, mission, organizational infrastructure, IT infrastructure, business strategy, and IT strategy. Each of these components was kept in alignment with the other components to enable NGHA to be successful in the evolving healthcare environment.

The planning process consisted of three phases: 1) Assessing the current NGHA environment within each of the CAM components. 2) Visioning the future NGHA environment within each of the CAM components, with an emphasis on the use of information technology. 3) Developing a plan to move toward the environment forecast by the vision. The IT steering committee, which has assumed responsibility for the ongoing governance of overall NGHA IT activities would review and revise this plan on an at least annual basis.

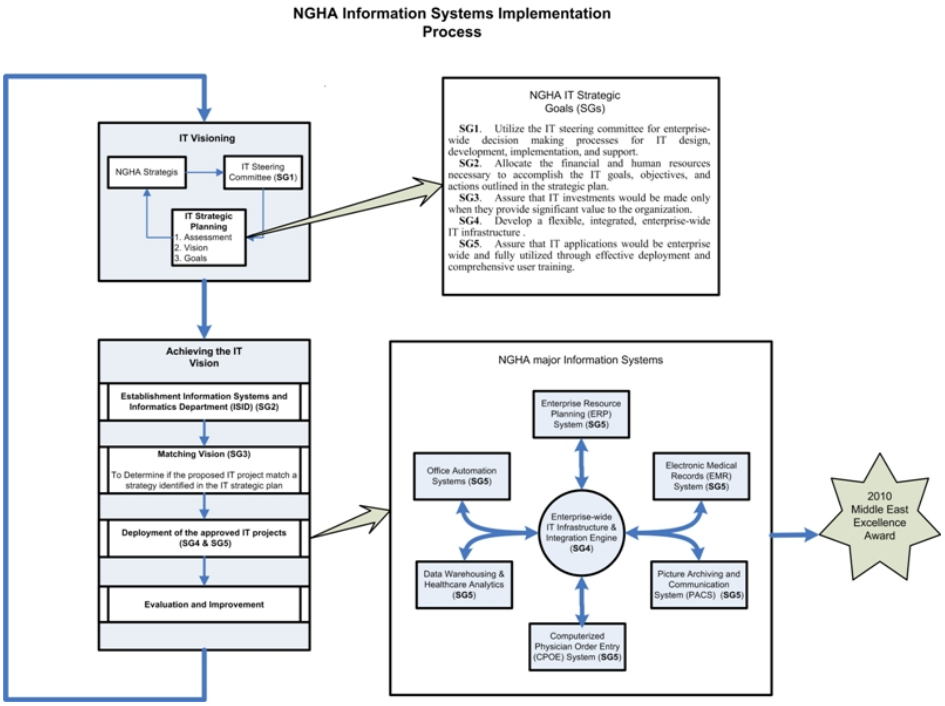

Figure 1. NGHA Information Systems Implementation Framework

1. Assessment of the NGHA environment

The assessment of the NGHA environment resulted in the development of a number of findings, the most important of which were:

- Relentless pressure to improve efficiencies and to achieve cost reduction would continue.
- Increased emphasis on providing coordinated services throughout the care continuum.
- NGHA lacked centralized data for corporate-wide use.
- The various NGHA entities had no easy mechanism to share data.
- NGHA lacked the ability to effectively capture, store, integrate, analyze, and report on multiple types of data.
- There was an important need for effective communication, both internally and externally.
- Several information technologies had emerged (e.g., client/server architectures, Internet/Intranet technologies, voice recognition, object-oriented).

2. Vision of the future NGHA environment

The visioning process aimed at forecasting NGHA's environment. The most important aspects of this envisioned environment were that:

- NGHA would be a more tightly integrated organization.
- Practice protocols would be much more standardized, with increased emphasis on clinical outcomes.
- Information would flow smoothly and efficiently throughout the continuum of care.
- Network communication systems would link NGHA with external health agencies as well as with its external business partners.
- Telemedicine and video conferencing applications would play a major role in the delivery of health care services.

3. NGHA IT Strategic Goals (SG)

The strategic goals were general goals that evolved directly from the IT Implications of the Vision including the following goals to:

SG1. Utilize the IT steering committee for enterprise-wide decision making processes for IT design, development, implementation, and support.

SG2. Allocate the financial and human resources necessary to accomplish the IT goals, objectives, and actions outlined in the strategic plan.

SG3. Assure that IT investments would be made only when they provide significant value to the organization and would be made in the most cost effective manner possible.

SG4. Develop a flexible, integrated, enterprise-wide IT infrastructure which includes technologies, processes, and people.

SG5. Assure that IT applications would be enterprise wide and fully utilized through effective deployment and comprehensive user training.

B. Achieving the IT Vision

1. Information Systems and Informatics Department (ISID)

In order to achieve the second goal, SG2, of the IT strategic plan, NGHA established a corporate level IT organizational structure called Information Technology and Informatics Department (ISID) as shown in Figure 2. The main goal of ISID department was to accomplish the IT goals and objectives outlined in the IT strategic plan. The ISID structure was designed as a corporate structure with separate IT-support teams in the regions to provide local IT services to each specific region. The structure also included corporate sections to support functional verticals such as the EMR, PACS, ERP, and the data center. The strategic technology decision making and the setting of standards have been centralized while administrative decision making has been local.

Historically, the NGHA IT department was responsible for defining as well as running the information systems required by the organization. Given the considerable expanded scope of IT outlined in the strategic Plan, it was likely that the IT department would assume a different array of responsibilities. Business departments within the organization would increasingly assume more responsibility in the design, procurement, implementation, and maintenance of their own information systems. To

assure that these systems function well together, the IT department would need to serve as a system integrator for the organization, coordinating its activities with the IT activities of all other business areas.

Therefore, ISID built a close links with medical departments by recruiting staff with health related background. ISID then provided these staff with proper training in health informatics.

2. Matching vision

This step corresponded to the third goal of the IT strategic plan (SG3). This step was concerned with the fit between a strategy in the visioning phase and an IT project or information system proposed. The IT steering committee played an important role in selecting the right projects that had a match with vision. NGHA allocated the required funds and human resources required to deploy these projects. Some examples of the NGHA approved projects include: IT infrastructure, ERP system, EMR system, PACS system, CPOE system, Data-warehousing solution, and office automation system as shown in figure 1.

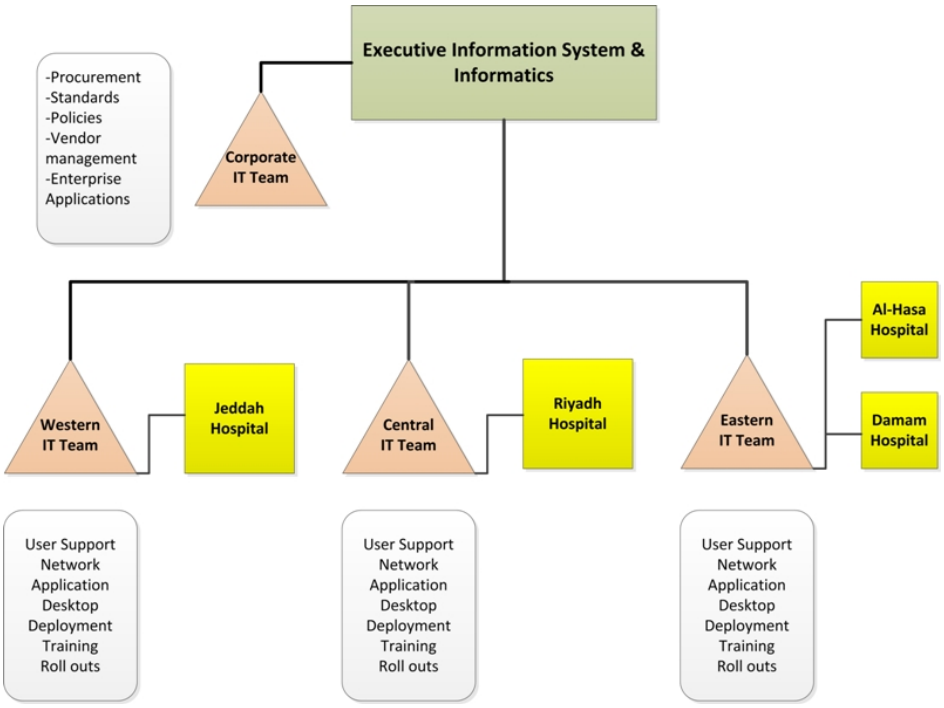

Figure 2. NGHA IT organizational structure

3. Deployment of the approved IT projects

This step included all decisions and actions related to the deployment of the approved IT project. It also included the assimilation and integration of the IT project or information system within NGHA. For each of the approved project, NGHA made an

extensive review of the available systems in the market and selected the packages that had the best match of the NGHA scope. NGHA decisions were based on several factors including price, supplier level of support, ease of implementation, and the level of technology advancement of the product. After the package selection, the projects went through a normal project life cycle until the IT project is fully deployed within NGHA.

4. Evaluation and Improvement

This phase was concerned with the continuous improvement and expansion of the system to ensure the quality of the IT project. After the successful deployment of the IT project or information system, the list of benefits and lessons learned were fed back to the visioning phase to be used to continuously review and update the strategies.

C. Major NGHA IT projects

1. Building the IT infrastructure

In order to achieve this goal, which corresponds to the fourth goal of the IT strategic plan (SG4), ISID established a new corporate data center department responsible for building and managing the IT infrastructure including the data center.

The IT infrastructure started in the early 90'swith a main frame system that provided service to around 200 to 300 users within the main hospital building. The network technology used was Ethernet on a thick coaxial cable that ran around 2000 meters across the main hospital using network repeaters and bridges. End users in the in-patient and out-patient areas had dumb terminals connected to the main frame system on the bus topology with a network speed of 10Mbps.

This network was unstructured and had very limited expansion and bandwidth options which called for the first major upgrade in 1998 and Asynchronous Transfer Technology (ATM) network back-bones were deployed. The network cabling was structured for expandability and a user access layer was introduced for bandwidth increase. The hospital was divided into areas where each area had its own access switches connecting the end users in that area. Access switches were, in turn, connected to the ATM backbones with two fiber links with a total of 310 Mbps connectivity. The end users received 100 Mbps connectivity to their PCs. The number of users served within the hospital and across the kingdom over WAN increased to 1600 in total.

In 2002, two Gigabit Ethernet backbones were introduced and a transition from ATM to a pure Ethernet network was carried out. With this upgrade, the network facilitated the provision of up to 10Gbps bandwidth in the backbone layer and up to 2Gbps between the backbone and access switches.

In 2005, a project was commissioned to upgrade all access layer switches in the campus. The total number of users who accessed the network recourses over the wired and wireless network infrastructure jumped to more than 5000.

In 2008 major network and system upgrades were launched. The network was restructured to comply with the industry's best practices for large scale medical grade networks. The number of users served reached more than 10,000 in 2008 and continued to grow to more than 15,000 in 2011.

NGHA main IT infrastructure has also included a main data center in the Central Region, in Riyadh, equipped with the highest technology of high-end servers and wide-area network capability. Another disaster recovery data center was also built to ensure

operational services continuity at all times. The main data center has been used to host the NGHA enterprise-wide information systems.

2. Implementation of ERP solution

NGHA procured an ERP solution in 1998 and developed the plan for implementation with the help of external consultant [14]. The ERP system has targeted areas such as logistics, purchasing, finance, maintenance, inventory control, and warehouse management. The implementation started first at King Abdulaziz medical City in Riyadh. The system was fully implemented in Riyadh in 2002 and the rollout to the other hospitals was carried out and was concluded in 2004. The human resource (HR) system was purchased from a third party due to the fact that ERP's HR systems did not support Arabic language at that time of implementation. Consequently, NGHA had faced some integration issues between the financial component of ERP and the external HR module. As a result NGHA decided to replace its HR module with the module that comes with the ERP to be fully integrated with the remaining ERP modules in 2008 [4]. The implementation of this project started in March 2008 and concluded in July 2010.

The ERP system has provided NGHA with:

- Streamlined human resources processes.
- Integrated supply chain management.
- Reduced inventory value.
- Better control of finance.
- Better data security.

3. Implementation of the electronic medical record (EMR)

With the vision to provide an efficient and accountable healthcare delivery system to support, NGHA purchased a commercial EMR system in 2001 to be implemented in all NGHA sites [15].

The EMR System included: Medical Records, Admission, Discharge, and Transfer (ADT) module, Order Management module, Pharmacy module, Radiology module, Laboratory interface, Emergency module, Operating Room module, Staff Scheduling module, and Clinical Decision Support module.

The EMR implementation project started in 2001 at King Abdulaziz Medical City in Riyadh. The system was operational in September 2004. The system took four years for stabilization before NGHA started the rollout phase to other NGHA hospitals. The rollout phase started in 2008 and was concluded in August 2010, almost nine years after purchasing the system.

The EMR system has provided NGHA with the following benefits:

- Optimizing the provision of healthcare.
- Unify the electronic medical record kingdom wide.
- Coordinating patient care activities throughout all NGHA hospitals and clinics by providing a single patient record to be accessed by all NGHA sites.

- Managing healthcare resources.
- Supporting decision making.
-

Due to the fact that NGHA has been a large/advanced healthcare that has provided specialized patient care, this has imposed NGHA to have several clinical information systems in addition to the EMR. However, the EMR would ensure unifying the patient record and provide physicians and other care providers with a single access to the patient record by integrating the different applications and clinical systems through an advanced integration system, as shown in Figure 3, to guarantee patient data integrity.

4. Implementation of PACS

Picture Archiving and Communication systems (PACS), is a solution for automating Medical imaging department from old film archiving techniques to effective electronic medical image archive and exchange.

Prior to the PACS implementation, NGHA had relied on a film-based radiology service. All images acquired in radiology were captured on films which were used for diagnostic and clinical review. The limitations of using film-based radiology service restricted the efforts to provide a more effective radiology services.

The PACS project was awarded in early 2006 and was implemented first at King Abdulaziz Medical city in Riyadh and went live in August 2007. The system was then rolled out to King Abdulaziz Medical City in Jeddah, and then to Eastern region hospitals early 2008. Currently, the PACS systems are implemented in all hospitals and most of the primary health care centers. With the large number of NGHA health care facilities covered by this system; this implementation is considered the largest in Saudi Arabia and the region.

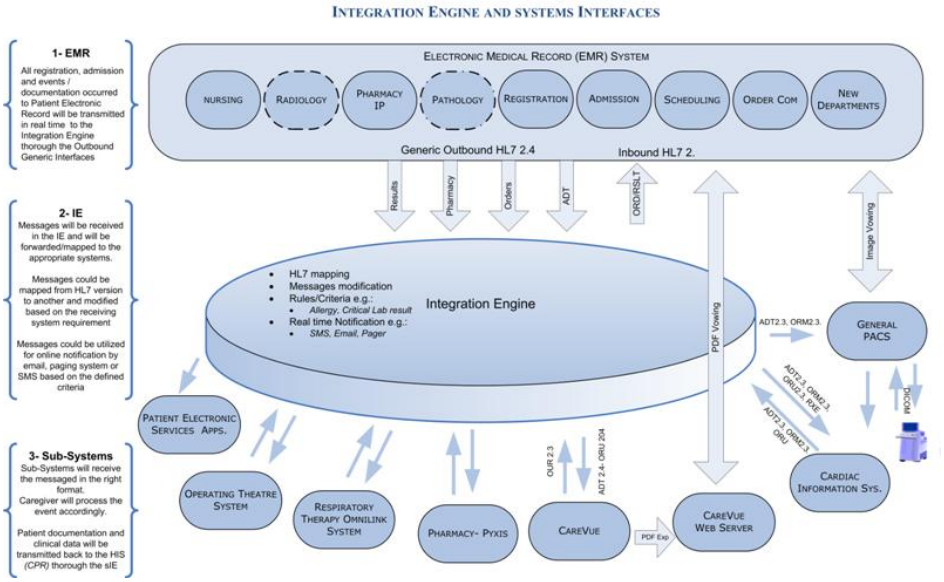

Figure 3. The main components of the EMR system at NGHA showing the integration engine used to integrate the different clinical systems.….

The PACS system has completely automated the Radiology department operations and connected all modalities to the Radiology Information System (RIS), which resulted in the following major benefits:

- A growing cost and space advantage over film archives.
- Enhanced capabilities of off-site viewing and reporting for radiologists.
- It has enabled practitioners in different physical locations to access the same information simultaneously. This function supported medical distance education and tele-diagnosis consultation.

With the implementation of such system; the National Guard Health Affairs has achieved a major step towards a complete patient Electronic Medical Record (EMR).

5. Implementation of Computerized Physician Order Entry (CPOE) System

CPOE is a process of electronic entry of physician's orders and instructions for the treatment of patients. These orders are usually communicated over the EMR system to other medical staff (nurses, therapists or other physicians) or to the departments (pharmacy, laboratory or radiology) responsible for fulfilling or documenting the order. CPOE uses clinical decision support systems and links to EMR systems to generate prompts and alerts during the ordering session to notify of potential errors such as contra-indicated medications or routes or duplicate orders [16].

NGHA started implementing the CPOE project in 2008 using the ordering features that existed in the EMR system. The CPOE system was implemented successfully in the Eastern Region hospitals (Al-Hasa, Dammam) in September 2009. The diversity of specialties and the size of Riyadh and Jeddah hospitals mandated a staged implementation approach. It is expected that CPOE will be operational in all hospitals by the end of 2011 [16].

6. Implementation of Data Warehouse

A Data Warehouse is a technology that provides a mechanism to assist in the aggregation of corporate data into a single location for ease of analysis. Once these data are centralized a number of standard inquiry and reporting software tools can be used to access the data. This activity will analyze the capabilities, requirements, and estimated costs associated with a Data Warehouse.

In August 2009, NGHA created a plan to create an enterprise health data warehouse that would aggregate information from clinical, financial, and HR databases within all three NGHA regions as shown in Figure 4 [11]. The project team has determined five major critical success factors for the project as follows:

- Clear contracts with the vendors needed.
- Clear project direction needed.
- Quick-wins required.

- Staff education and awareness.
- Data Standards and governance needed.

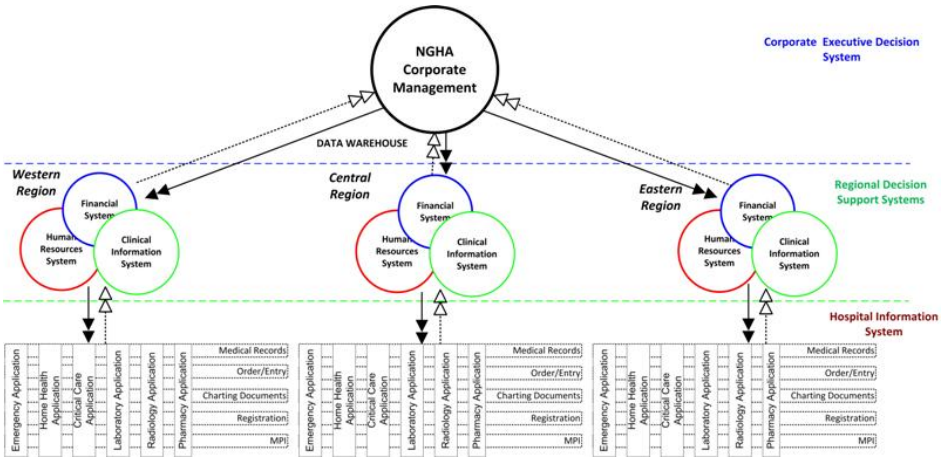

Figure 4. The NGHA information model.

However, NGHA postponed this project due to the fact that the EMR system uses a proprietary database system that made the efforts to build the data warehouse extremely difficult. The vendor of the EMR system used in NGHA has also realized the limitation of their system and has upgraded the EMR data base to relational database system using "cache" technology. NGHA started the upgrade of its EMR system database early 2011 and it is expected to be finalized in December 2011. NGHA would then resume the Data warehouse project which is expected to be accomplished in 2012.

7. Implementation of Office Automation systems

Office Automation systems are used to optimize manual tasks into electronic procedures by utilizing information technology for processing information, and communication technology for the movement of information from one place to another. Office automation systems cover many activities such as:

- Exchange of information
- Management of administrative documents
- Meeting planning and management of work schedules

NGHA established a Single, Corporate-Wide Email System that incorporates all NGHA-Professionals by 2001.It also built an intranet for Use by NGHA Employees and other authorized Users. The initial functions of the NGHA Intranet included easy and rapid file sharing, access to information of common interest (e.g., Policies and Procedures, Job Openings, Master Calendar of Events, News Letters/Bulletins, and Telephone/Personnel Directory), and computer-conferencing. This was developed in

2002.

Moreover, NGHA started in 2008 a project to introduce advanced office automation solutions based on the power of the web to bring together information, people and tools, regardless of time, location or devices and to automate work environment and establish digital workspace for NGHA employees. The project was organized in three phases:

> **Phase I:** To build the infrastructure of office automation at all NGHA sites which included unified active directory, upgrading messaging system, unified backup system, and internet sharing proxy. This phase started in August 2008 and was concluded in 10 months.
> **Phase II:** This phase included office automation engine, Enterprise Content management, document management, work flow, electronic form, and enterprise search. This project started in January 2010 and was completed in 2011.
> **Phase III:** This phase includes Enterprise archiving and correspondence system. The project started in October 2011 and expected to last for 20 months.

V. Lessons Learned

1. **Strategic Planning**: IT strategic planning is a critical success factor for information technology adoption. It is not a purely technical issue, but a management-oriented issue. At NGHA, the IT strategic planning encouraged the management to focus on long-term vision and was used in aligning IT strategies with business strategies.

2. **IT projects risks**: Healthcare organizations should be aware of the fact that the implementation of large information systems is still considered a complex and risky exercise. The failure rate of information systems implementation is very high. This does not indicate that health organization should miss the opportunities that these systems provide but rather be ready for this journey by learning about the risks associated with IT projects.

3. **The emerging IT role**: The role of IT department has changed from having the full responsibility to defining and running the information systems required by the organization to serving as a system integrator for the organization. Business departments now share the responsibility with IT departments related to information systems projects. Consequently, healthcare organizations should train its IT staff in the field of health informatics in order to fill the gap between IT department and business departments.

4. **IT infrastructure**: Organizations should build a robust IT infrastructure, with the right level of redundancy and availability. The infrastructure should be able to address all the information systems requirements. Any failure on the IT infrastructure might result in a higher resistance rate to the system by the end-users.

5. **Project management**: Health organization should adopt strong project management techniques and tools when implementing information systems. It is highly recommended that organizations establish an IT project management office (PMO) to implement the corporate strategy for project management. Organizations should not rush to deliver IT projects in the shortest time as it might affect the quality of these projects and lead to unwanted results. NGHA IT journey took 10 years to achieve national and regional excellence.

6. **Adequate training**: Training is another success factor in implementing information systems in healthcare. Organizations should adopt a strong methodology to train all the end-users who will interact with the information systems. NGHA used the "train the trainer" approach, where training was given to selected users called "key users" who, in turn, trained other end-users. Currently, NGHA had more than 6,000 end-users trained in the use of the various information systems.

7. **Systems integration**: Organizations should implement an enterprise solution for integrating information systems. Without this, the organization might end up having many one-to-one interfaces between information systems which makes the situation difficult to manage. NGHA purchased an international integration engine that integrates between all the different information systems.

8. **Health Analytics**: Organizations should expect that most of the commercial EMRs fall short in the area of healthcare analytics for informative decision making. Like many early adopters of EMR system, after ten years of implementation, NGHA is at a critical juncture of how to harvest and leverage the clinical operational data stored in the information systems throughout the organization. This is clearly one of the major difficulties NGHA currently faces.

9. **Political Stability impacts**: Organizations should consider the political stability in the region as a major risk. This due to the possibility that some of the countries to which some of the vendors of health IT solutions belong might have travel ban to Middle East countries. NGHA was faced with a similar situation during the EMR system Go-Live. As a result, only three out of the thirteen planned vendor staff came from the U.S to support the system.

10. **Local unique requirements**: When implementing international information systems, organizations should not expect that these systems would cover all the required functionalities. For example, the EMR system implemented in NGHA did not support the out-patient pharmacy functionalities, due to the fact that the EMR system was developed for U.S hospitals where out-patient pharmacy module was not a necessity. This is not the case for Saudi hospitals where they also have to support the out-patient pharmacy within the hospitals.

VI. Conclusion

Over the past four decades, Saudi Arabia has spent billions of dollars in developing and

improving the quality of healthcare and expanding its coverage in the country. However, this has not been accompanied by advancement of the health IT field, whose applications have become a necessity for hospitals to enhance the quality of healthcare and reduce the time and cost for healthcare delivery. One of the possible reasons for this is the fact that the failure rate for health IT projects is extremely high. In this paper we presented the experience of the NGHA, a leading health organization Saudi Arabia in the field health IT. The researcher reviewed all the IT projects executed in NGHA from 1998 to 2011 with special emphasis on the IT strategic plan that was developed in 1999 to guide all IT activities and investments of NGHA over the years following the plan. NGHA was able to achieve most of the goals outlined in the IT strategic plan and as a result, NGHA won the first Middle East excellence award in electronic health record.

In spite of NGHA success in the health IT field, Health Analytics, for informative decision making, was not achieved successfully. However, NGHA has a serious plan for achieving this goal in 2012. The paper also listed some lessons learned that could benefit other hospitals.

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