Building Consensus on the Readiness for EHR in Lebanon

Are Lebanon Hospitals ready to get rid of papers?

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Abbreviations and Acronyms

ATCB	Authorized Testing and Certification Body
AUB	American University of Beirut
BCA	Business Continuity Access
CCHIT	Certification Commission for Health Information Technology
CDA	Categorical Data Analysis
CPOE	Computerized Physician Order Entry
CPT	Current Procedural Terminology
DICOM	Digital Imaging and Communications
EHS	Electronic Health Solutions
EHR	Electronic Health Record
EMR	Electronic Medical Record
EMRAM	Electronic Medical Record Adoption Model
FHIR	Fast Healthcare Interoperability Resources
GDPR	General Data Protection Regulation
HICP	Harmonized Index of Consumer Prices
HIMSS	Health Information and Management Systems Society
ICT	Information & Communication Technologies
IDC	International Data Corporation
IHE	Information Health Exchange
IT	Information Technology
LOP	Lebanese Order of Physicians
MOI	Ministry of Interior
MoPH	Ministry of Public Health
MOSA	Ministry of Social Affairs
NSSF	National Social Security Fund
OCeH	Office of Consumer eHealth
ONC	Office of the National Coordinator
PSO	Policy Support Observatory
QRDA	Quality Reporting Document Architecture
RFI	Request for Information
SNOMED	Systematized Nomenclature of Medicine
UHC	Universal Health Coverage
US	United States
WB	World Bank
WHO	World Health Organization

Executive Summary

The Policy Support Unit at the Ministry of Public Health set the "Support of Modernization of Health Care Provision towards UHC". One of the elements of this priority was the dissemination of a "State-of-the Art EHR, that will facilitate continuity, coordination and affordability, package definition, gatekeeping, rational e-prescription and between provider communication; and generate the KPIs for the Health Sector". To achieve that goal, WHO is providing the necessary support, with fund raising for the development or adoption of a national Electronic Health Record (EHR) across the country, where by, within 5 years, all health care providers would be able to use such EHR. This will make real data on patient health and selected health system utilization more readily available for population health monitoring as well as for health system performance assessment.

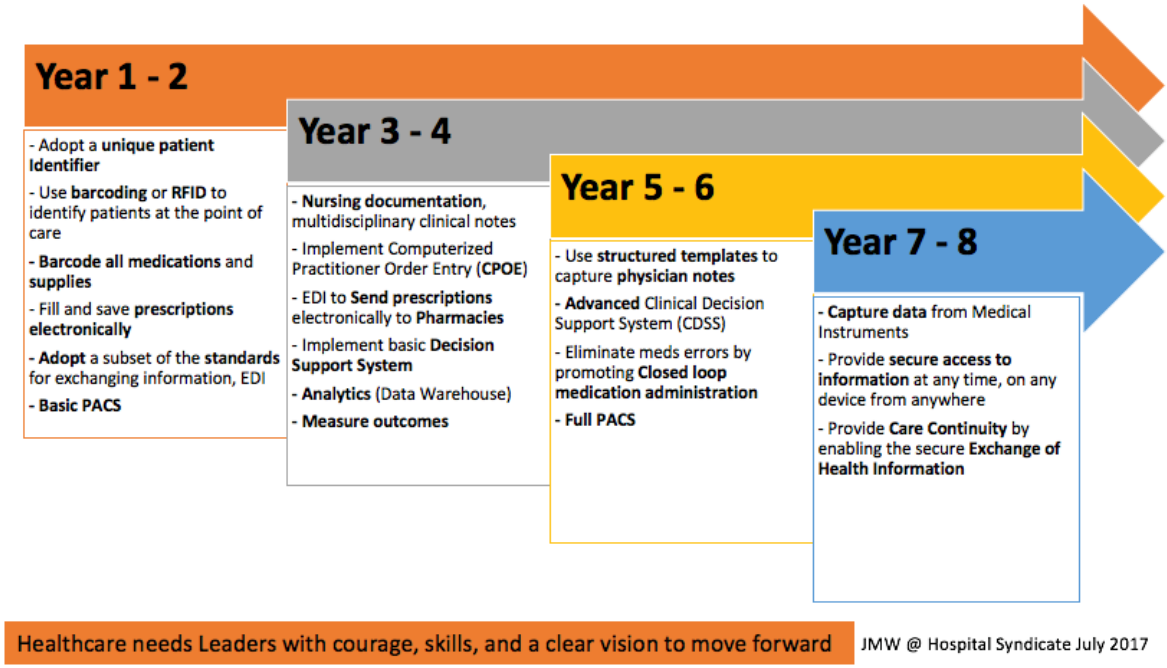
This document intends to guide readers as concisely as possible about the issues of eHealth and Electronic Health Records (EHR) adoption in Lebanon. It contains 3 sections:

- Section 1 - White Paper: In this section, issues to be addressed in EHR implementation in hospitals and health centers are reviewed with supporting literature.
- Section 2 - **Summarizes Focus Group discussions with Lebanon eHealth potential stakeholders, an online survey of these stakeholders and the proceedings of a capstone general assembly held on June 15, 2019.**
- Section 3 - A model Request of Information (RFI) for MoPH and private hospitals to use to solicit offers from EHR vendors as an applied useful tool.

The highlight of this activity was in the consensus of stakeholders on the following:

- Lebanon needs **to regulate EHR adoption.** The preferred regulatory body would be MoPH or a private-public organization like EHS in Jordan (https://ehs.com.jo/) or "Electricite du Liban" in Lebanon.
- The regulatory body would need to **"certify" EHRs** to be adopted in Lebanon hospitals and Clinics and develop regulations to ensure **citizens privacy** and ability of **systems to interoperate.**
- There should a smaller number of certified EHRs adopted by groups of hospitals. These EHRs should be **internationally interoperable and compliant with GDPR** and other privacy regulations.
- **The public sector can adopt one system and subsidize its adoption by private hospitals.**
- **MoPH would need to lead** the effort of putting a road map to achieve EHR implementation in a way similar to what was done in Jordan or Estonia or Luxembourg.
- **MoPH can incentivize EHR adoption** by making its use as essential part of accreditation and requires electronic claims submissions and chart audits.
- **Training programs** to develop the needed Information Technology specialists should be developed.
- **Electronic privacy and signature legislations** should be developed and applied.
- Unique identifiers should be agreed upon and adopted, particularly: Unique patient identifier, medical acts, diagnoses, payments and medications.
- A model public hospital EHR can be implemented as a pilot initiative to explore human resource and training needs.
- The suggested road map for eHealth (Figure 1) was well received though judged too optimistic.

Figure 1: Suggested roadmap for transforming patient care documentation in Lebanon hospitals



The next steps agreed upon to be followed were:

- Agreeing on the composition of a Governing Body/Entity that will be responsible for overseeing and ensuring the continuity of this project
- Deciding on the framework for generating a unique patient identifier at the national level
- Developing a request for information (RFI) document to be used by MoPH

Immediate action items emanating from the various forums and discussions were:

- **An intergovernmental committee needs to develop and mandate use of a national patient identifier**
- MoPH should issue a resolution **defining the minimum requirements** for an EHR at the national level
- MoPH should **impose minimum standards** to be adopted by the local software companies
- Set a **long-term plan for this project**, taking into consideration that the technology field is evolving rapidly and falling behind is not an option
- **Learn from the experiences of other countries** instead of reinventing the wheel
- **Ensure data security**, especially to take into consideration the requirements of the military and security forces
- Prioritize the need for **interoperability** standards to be adopted by all software providers
- MoPH stressed that **hospitals and health institutions should put their plan to purchase and adopt an EHR on hold until the list of standards is defined**
- All **vendors must abide by the set of standards once defined by MoPH**
- **MoPH will certify providers based on their adherence to the list of required standards**
- MoPH will monitor the prices imposed by the vendors **to prevent any kind of monopoly**

Introduction

In the last 2 decades, technology has been continuously listed as one of the top impactful trends affecting healthcare delivery. It is quite natural that we explore how Lebanon can leverage technology in health care to improve the Health of its citizens. It is in this spirit that the Policy Support Observatory (PSO) at the Ministry of Public Health (MoPH) set as one of its work program projects the "generalization of the use of state of the art electronic health records" [1]. The PSO is a collaborative unit at MoPH that brings together MoPH and the American University of Beirut (AUB) and the World Health Organization's Lebanon Office (WHO).

MoPH has engaged in many eHealth initiatives related to financial monitoring of services purchased from hospitals by MoPH or citizens direct services. It also launched a "National eHealth Program" in 2013 aiming at regulating and addressing the various aspects of eHealth in the country and a National PHC network with support from the World Bank, as well as an electronic patient encounter form, linked to the PHENICS automation system designed to monitor the WB supported EPRHP.

The WHO also supported a mission whereby experts in EHR development from Jordan presented the Jordanian experience in deploying a common EHR across all of Jordan public hospitals and clinics. A similar program is contemplated for Lebanon, with customization as needed.

All these initiatives are in response to the fact that most health care institutions in Lebanon continue to provide care supported by paper-based processes. Many use electronic billing systems but few use electronic medical records (EMRs) and only a couple use integrated certified electronic health records (EHRs). The proposed "generalization of the use of state of the art electronic health records" has been set as one of MoPH building blocks towards "modernizing health care provision for universal health coverage with people-centered care"[1]. The purpose of this "technological modernization" is three-fold:

- To provide any health care provider with a spontaneous and secure access to a patient's medical record when necessary and with due respect to patient's privacy.
- To allow exchange of medical, service and financial information among health care providers, insurers and administrators with minimal technical limitations and due respect to patients' privacy and information exchange security.
- To allow ministries and health institutions to collect medical information for planning and delivering services with due respect to patients' privacy and information exchange security.

As we engage in this journey, it is essential that all stakeholders share a common understanding of the value of these goals and the pre-requisites for such a national project:

- What are the requirements of a "state of the art electronic health record"?
- What would it entail at the level of legislation, infrastructure and human and financial resources? [2]

Besides understanding the pre-requisites and goals, a common use of terminology among stakeholders is also necessary. For example, we commonly use EMR and EHR interchangeably when the first (EMR) refers to health related information of a patient within one health care organization while the latter has a broader outlook with a system that "conforms to nationally recognized interoperability standards" and thus has the potential to communicate beyond one institution [3]. A glossary of terms derived from various online sources is attached to this document (Appendix 1).

This paper explores these issues and offers a baseline background information for Lebanon Health IT stakeholders to be engaged in developing the eHealth roadmap to achieve MoPH vision.

What is eHealth [4]

The term eHealth first appeared around 2000 and has carried different meanings in the minds of people with more than 50 different definitions [5-7].

In the United States of America, the Office of the National Coordinator for Health Information Technology (ONC) uses "Health IT" to refer to "technologies that allow health care professionals and patients to store, share, and analyze health information" [8]. ONC lists Electronic Health Record and Personal Health record under Health IT. ONC also has an Office of Consumer eHealth (OCeH) which purpose is to improve consumers Access, Action and Attitude (3 As) vis a vis the use of Health IT. Examples of such eHealth programs include the Meaningful Use Incentives, Blue Button, Sharecare and Innovation Challenges [9]. This eHealth office was integrated in other ONC units in 2018.

The European commission defined eHealth in its eHealth Action Plan 2012-2020 [10] as "the use of information and communication technologies (ICT) in health products, services and processes combined with organizational change in healthcare systems and new skills, in order to improve health of citizens, efficiency and productivity in healthcare delivery, and the economic and social value of health".

For our purpose we will adopt the simplest and most encompassing definition used by WHO: **"the use of information and communication technologies (ICT) for health"**. WHO also notes that "eHealth is about improving the flow of information, through electronic means, to support the delivery of health services and the management of health systems" [11].

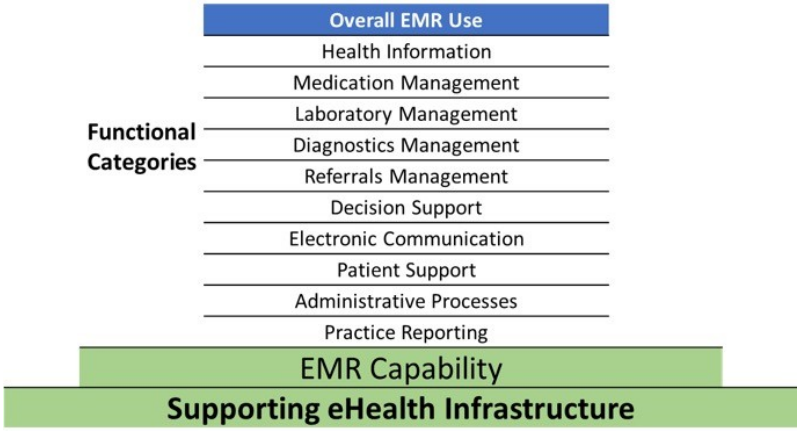
We will also limit this discussion to eHealth elements related to "patients" cared for in "medical" environments (e.g. hospitals and medical centers). We will not address population or public health issues.

Value from eHealth

The value from using ICT in health is not realized when technology is simply used to "digitize paper" [12]. Benefits from eHealth adoption imply capitalizing on advanced electronic medical records functionalities and features or using technology in a "meaningful" way. **Meaningful implies that the use of a tool would result in an outcome that matters in the care of an individual, affecting the quality of life or morbidity of the person**.

Price describes 10 functional categories (Figure 2) where meaningful value could result from using technology. The overall EMR meaningful use depends on the availability of these categories which are a function of the EMR capabilities and gain more value with a proper supporting eHealth infrastructure. This digital maturity model powerfully simplifies legislation adapted in numerous countries such as meaningful use in the US or eHealth strategies in Europe [13] as well as the industry standard Health Information and Management Systems Society (HIMSS) Electronic Medical Record Adoption Model (EMRAM) [14]. The foundation for a successful EMR use and patient quality of care delivery becomes a solid eHealth infrastructure.

Figure 2: Price's Model of EMR Adoption



What do we really want out of EHRs?

The various models of adoption or maturity address how we use information resources to support patient clinical care, service and administrative functions. A unit is more mature in its e-care delivery when its various digital tools are more integrated, easily exchange information and assist in decision making. The more sophisticated the system the more it is able to tap into diverse sources of data to assist the clinician or administrator offer the patient safer, timelier, effective, efficient, equitable, patient centered care (STEEEP) [15-17]. A modified list of EMR benefits from Scott et al [18] is shown in Box 1.

Box 1: Predicted EMR benefits [18]

Processes of care

- Instantly available record accessible by multiple users at multiple locations
- Access to information on site or by remote access
- Improved accuracy, legibility, structuring, reliability and retrieval of information
- Ability to add orders and start processes without doctors being physically present
- Problem lists, past medical histories, allergies and alerts that are entered once
- Automation of pathology and radiology requests, care plans, reminders and alerts discharge summaries and clinical decision support
- Faster entry of vital signs and easier documentation of care plans
- Transparency of actions with audit trails and tracking
- Fewer errors in drug prescribing, dispensing and administration
- Evidence-based decision support with improved adherence to clinical guidelines
- Easier investigation of incidents and discrepancies

Patient outcomes

- Reduced length of stay
- Fewer readmissions
- Lower mortality
- Less interview and investigation burden by reducing duplication

Financial benefits

- Reduction in direct costs
- Accrued economic benefits due to reduction in medication ordering, dispensing and administration errors, length of hospital stays, potentially preventable hospitalizations and unplanned readmissions, staff time to find information, and nursing time to input vital signs through interactive mobile devices.

The progression from simple paper documentation to integrated electronic information management has not been smooth in the last few decades. Practical, legal, medical and financial issues have often challenged adoption progression despite a perceived association between EHR use and quality of care delivered [19]. When we talk about EHR we imply more than simple digitization of papers. As stated earlier, more "functions" are expected in EHR than simply storing a static picture of a patient encounter. An EHR is expected to make information on a patient or a provider or episodes of care or services administered, available in different formats for multiple users from different locations without repetitive entry. The more mature an EHR system the more it allows wider interactions in kind and reach: administrative and clinical data from different units or sources becoming easily exchangeable or interoperable.

eHealth 10E's [6]

Huang et al., (2010) succinctly summarize the benefits of mature EHRs in 10 descriptors starting with the letter "E". This same set is often used in other adoption models [20]. Table 1 summarizes the anticipated benefits of a mature EHR.

Table 1: E Benefits of EHRs – the 10E's

Efficiency	Support cost effective healthcare delivery
Enhancing quality	Reduce medical errors
Evidence based	Support evidence-based medicine
Empowerment & Encouragement	Help patients to be more active and informed in their healthcare decisions and treatments
Education	Help physicians and patients understand the latest techniques and healthcare issues
Extending the scope of care & Enabling information exchange	Do not limit healthcare treatment to conventional boundaries
Ethics	Including but not limited to privacy and security concerns
Equity	Decrease rather than increase the gap between "haves" and "have nots"

The minimum EHR functionalities necessary to achieve these E benefits are shown in Table 2. These functionalities cover administrative, clinical and community related elements and the system will need to exchange this information with other systems. The authors developed this list using the institute of medicine core functionalities of an EHR system as well as HL7 functional model and Certification Commission for Health Information Technology (CCHIT) criteria [21].

Table 2: EHR FUNCTIONALITY REQUIREMENTS [21]

Organize Patient Data	Patient Demographics Clinical/Encounter Notes Medical History Record Patient-Specific Information Patient Consent Generate Reports Advance Directives
Compile Lists	Medication Lists Allergy Lists Problem/Diagnoses Lists

Receive and Display Information	Laboratory Test Results Radiology Results Radiology Imaging Results Capture External Clinical Documents
Order Entry (CPOE)	Electronic Prescribing Reorder Prescriptions Laboratory Order Entry Radiology Order Entry
Decision Support	Reminders for Care Activities Dosing Calculator Preventive Services Drug Alerts Disease or Chronic Care Management Knowledge Resources Clinical Guidelines
Communication and Connectivity	Electronic Referrals Clinical Messaging/ E-mail Medical Devices
Administrative and Billing Support	Scheduling Management Eligibility Information Electronic Billing/ Integration with Practice Billing System Drug Formularies Clinical Task Assignment and Routing
Other	Immunization Tracking Public Health Reporting Patient Support

Historically, health care units did not acquire all these functions at one time but adopted them gradually and in a cumulative way. This is why health IT adoption is described as continuous process of maturation rather than a shift from one state (paper) to another (electronic).

Digital Maturity

The concept of digital maturity originated from eGovernment initiatives which purpose was to make government services more citizen centric with the same vision being applied to health care. As such, "Digital Maturity" is not only the availability of resources and system sophistication but also the ability of systems to interoperate and impact the public [22].

Standardization and Interoperability are the backbone requirements for a mature eHealth environment. The Monaco news Paper Nice Matin describes the goal of such an approach to the public in very simple language [23]: « Aujourd'hui, il n'existe pas de système d'échange numérique entre les établissements de soins….faire en sorte que caisses sociales, médecins, pharmaciens, infirmiers et autres puissent échanger facilement les données de leurs patients et améliorer le suivi des soins… Les patients n'auraient qu'un seul dossier, avec un identifiant et un mot de passe pour avoir accès à leurs informations de santé personnelles»

Maturity of systems is described using models of which the most renown is the HIMSS EMRAM (Figure 3) where a controlled medical vocabulary for standardization and interoperability is at the basic foundation stages.

Health Information and Management Systems Society (HIMSS) Electronic Medical Record Adoption Model (EMRAM) [14]

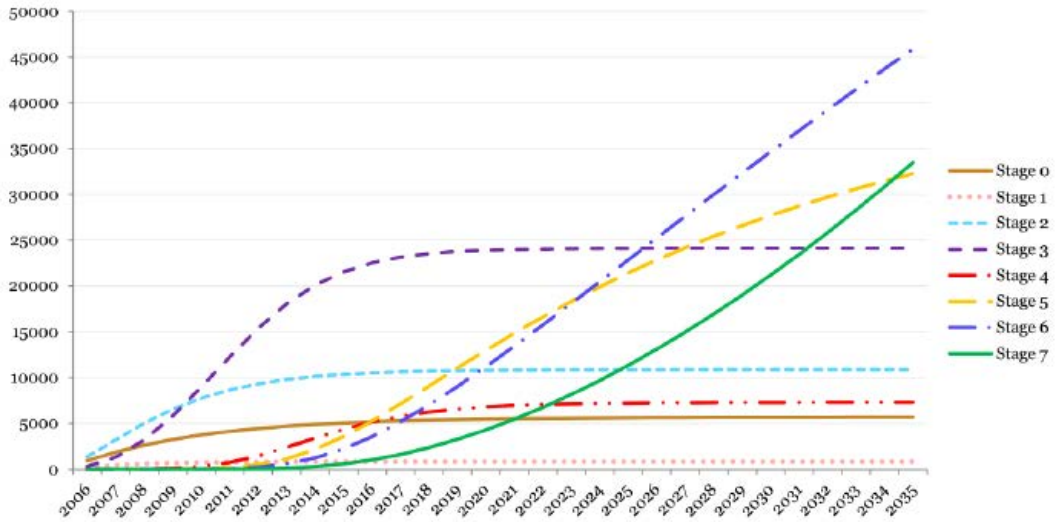
The EMRAM model lists 8 stages describing cumulative functionalities of an electronic system. These stages are specific and measurable milestones commonly, but not necessarily, achieved in a sequential manner. Hospitals and health centers implementing EMRs are classified based on the functions they adopt from the EMR and with an ultimate goal of maximizing benefits realization from the adopted technology, essentially, safer and higher quality patient centered care.

Figure 3: HIMSS Analytics EMR Adoption Model (2018 US)

STAGE	HIMSS Analytics EMRAM EMR Adoption Model Cumulative Capabilities
7	Complete EMR: external HIE, data analytics, governance, disaster recovery, privacy and security
6	Technology enabled medication, blood products, and human milk administration; risk reporting
5	Physician documentation using structured templates; full CDS; intrusion/device protection
4	CPOE; CDS (clinical protocols); Nursing and allied health documentation; basic business continuity
3	Nursing and allied health documentation; eMAR; role-based security
2	CDR; Internal interoperability; basic security
1	Ancillaries - Lab, Rad, Pharmacy, PACS for DICOM & Non-DICOM - All Installed
0	All Three Ancillaries Not Installed

Figure 4 shows actual and predicted adoption levels of US hospitals. The analysis predicts most hospitals in the US will be above stage 5 by 2020.

Figure 4: Cumulative number of US hospitals at each EMRAM level (2006-2035) – [24]



Digital Hospital

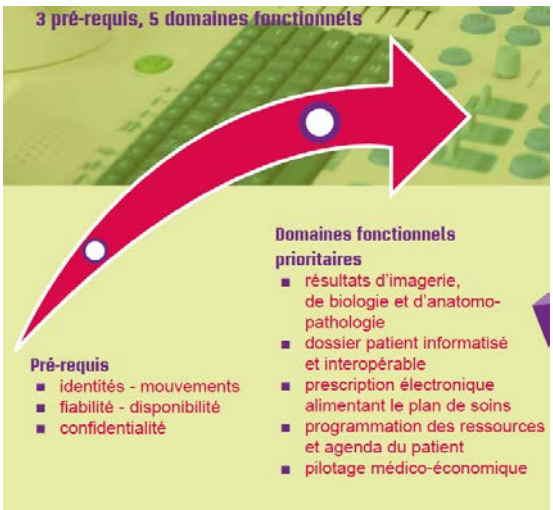
After the US introduced its "meaningful use" incentive initiative to motivate EHR adoption, it did not take much for other nations to embark into similar endeavors. Everyone realized that simple digitization is of little value and true transformation in health care needs engaging stakeholders (People) and changing workflows and practices (Processes). This perspective is well described in France's digital hospital program pre-requisites and functional domains to be achieved through changes in their governance, training, financing and support [25]. Similarly, to the US government "meaningful use" incentive program, France's digital hospital project aims to "relate the right information to the right patient at the right time and location – under all circumstances – with privacy maintained. These are its 3 essential pre-requisites:

1. Relate the right information to the right patient at the right time and location (Identite / Mouvement). This requires
    a. The use of unique references to patient identity, episode of care and transfers of care
    b. An active unit that maintains master patient records
    c. An up to date chart and database of the health care unit's organizational structure
2. Under all circumstances (Fiabilite / Disponibilite) or Business Continuity Access (BCA) at all times. This requires
    a. A documented and formal workflow for BCA during system failure or downtime
    b. Different action plans based on severity and duration of failure
3. With privacy maintained (Confidentialite):
    a. Documented and adopted Risk management strategies
    b. Documented access practices that protect patient confidentiality with documented consents from users to adopt them
    c. Access protocols defined and verified

The French essential functional categories are 5:

1. Access to Laboratory and Radiology results
2. Interoperable patient record
3. Electronic prescription
4. Patient and health care resources scheduling
5. Utilization and financial dashboards

Figure 5: France's Digital Hospital Project Foundation
(Le Socle Commun du Programme Hopital Numérique)



Certified EHR

It was natural that after setting the criteria for a beneficial EHR and its requirements that a formal approach would be used to identify the technologies able to meet the requirements leaving institutions to work on their processes and resources to meet the standards.

In the US, the Certification Commission for Health Information Technology (CCHIT) was created in 2004 and adopted by the US Department of Health and Human Services to develop criteria and accredit EHRs as a recognized certifying body. CCHIT was later adopted by ONC to continue same role (ONC_ATCB) (Figure 6) [26]. Similarly, other bodies emerged in other countries [27] for example The European Institute for Health Records (EuroRec at http://www.eurorec.org) or Canadian or UK organization offer certification of vendors using similar criteria and approach as US ONC [27, 28].

Figure 6: Structure of EHR certifying bodies in the US

Elements to certify [29]

As stated above, the purpose of classifying EHRs and adoption efforts by organizations is mainly to move them to higher sophisticated levels that provide better and safer patient care. Incentives were placed for users to adopt "meaningful practices" and later on penalties for those who could not catch up with developments. **The certified EHR distinctiveness is its compliance with standards and interoperability.** ONC lists 60 elements required to achieve levels of interoperability and safety grouped into 8 categories:

Category	Criterion
Clinical	Computerized provider order entry (CPOE) for medications, laboratory tests and diagnostic imaging
	Drug-drug and drug-allergy interactions
	Drug formulary and preferred drug list check
	Clinical decision support
	Patient information, including: demographics; family health history; smoking status and patient-specific education resources
	Lists, including: problems; medications; and medication allergies
	Implantable devices
	Social, psychological and behavioral data

Category	Criterion
Care coordination	Transitions of care documents
	Clinical information reconciliation and incorporation
	Electronic prescribing
	Common Clinical Data Set summary record—create and receive
	Data export
	Data segmentation for privacy—send
	Care plan
Clinical Quality Measurements	Record and export
	Import and calculate
	Report
	Filter
Privacy and security	Authentication, access control, authorization
	Auditable events and tamper-resistance
	Audit reports
	Amendments
	Automatic access time-out
	Emergency access
	End-user device encryption
	Integrity
	Trusted connection
Patient engagement	View, download and transmit to third parties
	Secure messaging
	Patient health information capture
Public health	Transmission to immunization registries
	Transmission to public health agencies—syndromic surveillance
	Transmission to public health agencies—reportable lab tests and values/results
	Transmission to cancer registries
	Transmission to public health agencies—electronic case reporting
	Transmission to public health agencies—antimicrobial use and resistance reporting
	Transmission to public health agencies—health care surveys
Design & performance	Automated numerator recording and automated measure calculation
	Safety enhanced design
	Quality management system
	Accessibility-centered design
	Consolidated CDA creation performance
	Application access, including: patient selection; data category request and all data request
Transport methods	Direct Project
	Direct Project, Edge Protocol and XDR/XDM

Readiness Assessment

The adoption of technology in Lebanon hospitals and health centers has not been well documented; however, WHO has been conducting surveys periodically to gauge the country's eHealth readiness [30]. The 2015 survey assessed the country's readiness for eHealth (as defined above) by exploring availability of a variety of factors shown in Box 2.

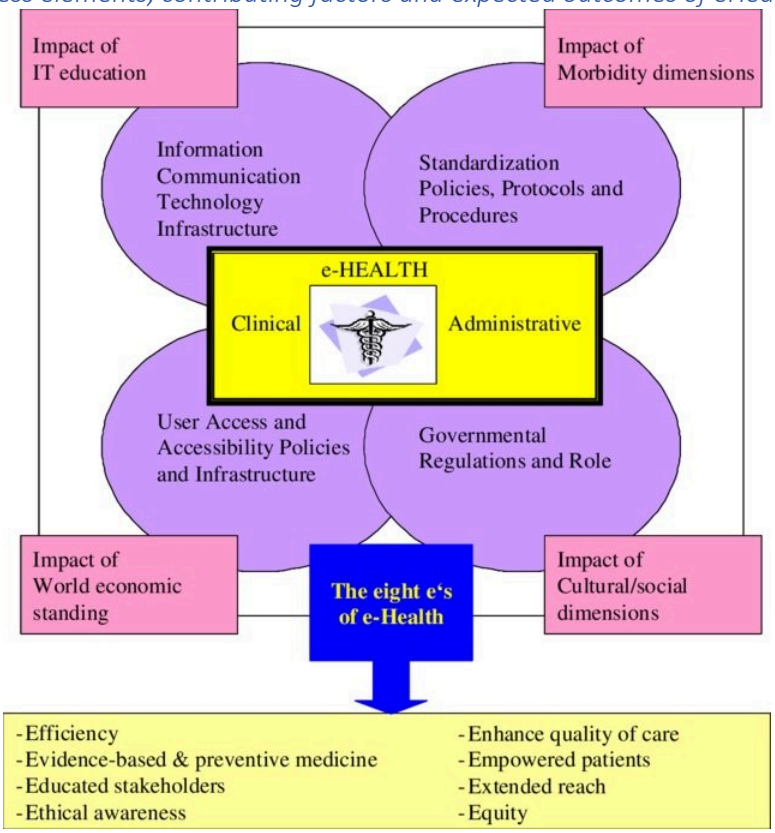
Box 2: WHO eHealth readiness survey elements

1. eHealth foundations
    a. National policies or strategies
    b. Funding sources for eHealth
    c. Multilingualism in eHealth
    d. eHealth capacity building
2. Legal frameworks for eHealth
    a. Policy or legislation
3. Telehealth programs
4. EHR availability
    a. National system
    b. Legislation governing the use of EHR
    c. Health facilities with EHRs
    d. Other electronic systems used
    e. ICT assisted functions
5. Use of eLearning in health sciences
6. mHealth
    a. Accessing and providing health services
    b. Accessing and providing health information
    c. Collecting health information
7. Social Media
    a. National policy or strategy on use of social media by government organizations
    b. Policy specific to social media use in the health domain
    c. Use of social media by organizations
    d. Use of social media by individuals and communities

The survey addresses the wider aspect of eHealth "the use of information and communication technologies (ICT) for health" covering telehealth, mHealth, education and social media in health. The conceptual framework for such a survey could be easily formulated based on Wickramasinghe et al's framework where four pre-requisite groups for eHealth are defined (Wickramasinghe et al., 2005) (Figure 7):

1. Infrastructure
2. Standardization
3. Accessibility regulation
4. Government regulation

Figure 7: Readiness elements, contributing factors and expected outcomes of eHealth programs [2]



Appendix 2 shows the results of the 2015 survey of Lebanon. Issues related to "generalization of the use of state-of-the-art electronic health records" stand out as relating to the need for legislation and funding and an obvious lack of information on where we are with the number of facilities with EHRs and their types and maturity levels.

This lack is the basis for PSO's investigation and reach out to Private Hospitals Syndicate and Public Sector stakeholders to have a factual picture of the state of eHealth in the country and set up a roadmap for addressing pre-requisites as a priority.

Section Two: Lebanon Readiness & Consensus 2019 Activity Overview

Using Wicramasinghe model [2] and Scott et. Al [18] (Appendix 3) and WHO eHealth survey content [30] we developed a set of Focus Group discussion questions (Box 3) and an online survey to administer to Lebanon health stakeholders with the intent to come up with an agreement on the pre-requisites that MoPH has to address to ensure a successful eHealth transition. The stakeholders selected as targets of this inquiry, included:

1. Public providers: MoPH, MOSA, MOI, Military
2. Private providers: Private hospitals, LOP, Nursing
3. Payors: Health insurance, NSSF, Military
4. Beneficiaries: Consumer protection
5. Information technologists (LITA, Universities)

The main objectives of this inquiry were:

1. To describe the readiness of Lebanon hospitals to adopt electronic health records
2. To describe the expectations of Lebanon hospitals of an electronic health record
3. To develop a request for information (RFI) document to be used by the ministry of public health to explore available vendors able to provide the perceived needed EHR

A detailed report of the results of the focus group discussions and the readiness survey are shown in the Appendices 4 and 5. A summary of the salient findings follows.

Box 3: Focus Groups Discussion Issues

Q1. Why do you think EHR has not yet rolled out in Lebanon?
Q2. What do you think is the most important factor of success of EHR?
Q3. How soon do you expect EHR to be implemented in Lebanon?
Q4. How do you think the healthcare sector can benefit from installing an EHR?
Q5. What are the barriers that you expect to face while the migration or integration process takes place?
Q6. What are your suggestions to overcome these barriers?
Q7. Which of the Pre-requisites for eHealth goals do you think is the most challenging?
Q8. What is your organization's objective for implementing an EMR/EHR?
Q9. What do you think are the IT related interoperability standards that need to be available so that EHR can be successfully implemented?
Q10. What would you like to see added to the current means and channels of operations with hospitals?
Q11. What do you think are the necessary legislations for EHR to roll out?
Q12. How do think this project could be funded?
Q13. How do you see things moving?
Q14. Is there anything other than the already discussed questions you would like to add?

Focus Group Discussions

Three separate focus group discussions were held with different stakeholders' categories: Information technology (IT) specialists, private hospitals and third-party payers' representatives. Questions guiding the discussion are shown in Box 3.

Challenges, barriers, and success factors at the level of the 4 dimensions of EHR adoption were generated from these focus group discussions. The major themes discussed at the level of the "Governmental Regulations and Roles" dimension were: Poor governmental mandate and

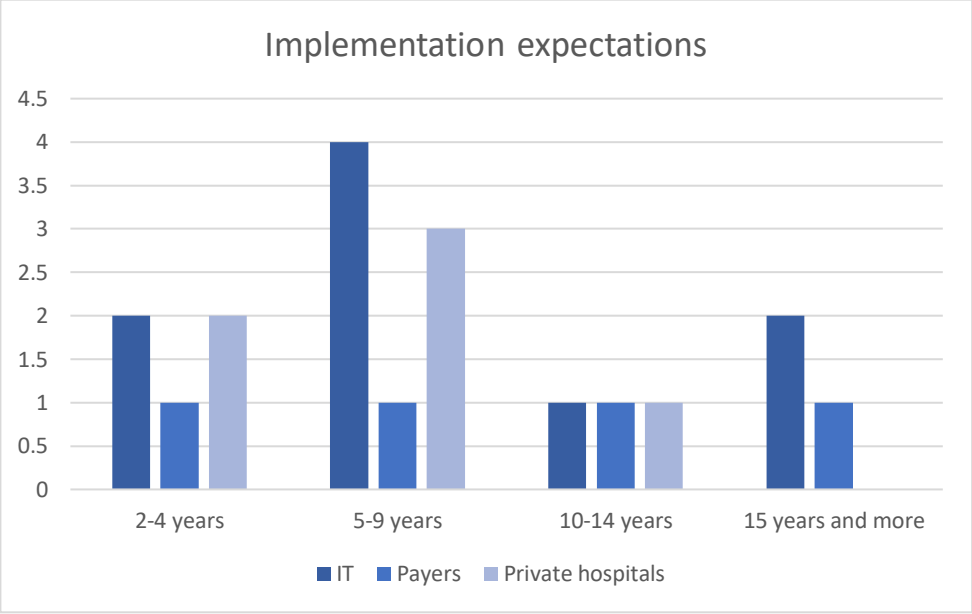
coordination, weakened leadership, fragmented health sector, etc. Many participants suggested that commitment, support, and cooperation are necessary to overcome these barriers.

The majority of stakeholders believed that lack of awareness on the benefits of EHR as well as data privacy and confidentiality are the major barriers under the "User Access and Accessibility Policies and Infrastructure" dimension.

On the other hand, the lack of unified standards was the most recurrent theme under the "Standardization, Policies, Procedures, and Protocols" dimension. Feedback on the "Information Communication Technologies Architecture/Infrastructure" dimension showed that high cost, data storage issues, and weak infrastructure are the main barriers to the implementation of EHR.

Figure 8 shows that the majority of participants expected that EHR would be implemented in 5-9 years (8 participants) in Lebanon, 5 participants expected it to be implemented in 2-4 years, 3 participants expected it to be implemented in 10-14 years and 3 participants expected it to be implemented in 15 years and more.

Figure 8: Bar Chart showing stakeholders' expectations concerning EHR implementation timeline in Lebanon



A fourth focus group **discussion was conducted with decision makers at the level of Orders, Syndicates and Governmental Entities in the healthcare field**. They agreed with the themes that emerged from the previous focus group discussions and they stressed on the following issues:

- **Having a national patient identifier**
- MoPH should issue a resolution **defining the minimum requirements** for an EHR at the national level
- MoPH should **impose minimum standards** to be adopted by the software companies
- **Learning from the experiences of other countries** instead of reinventing the wheel
- Setting a **long-term plan for this project**, taking into consideration that the technology field is evolving rapidly and falling behind is not an option
- **Ensuring data security**, especially to take into consideration the requirements of the military and security forces

Following the Focus Group discussions and based on the themes generated, a meeting was held with **software provider companies** that are currently operating in Lebanon. Several points were discussed including:

- Prioritizing the need for **interoperability** standards to be adopted by all software providers
- MoPH stressed that **hospitals and health institutions should put their plan to purchase and adopt an EHR on hold until the list of standards is defined**
- All **vendors must abide by the set of standards once defined by MoPH**
- **MoPH will certify providers based on their adherence to the list of required standards**
- MoPH will monitor the prices imposed by the vendors **to prevent any kind of monopoly**

Online Survey

An online survey titled "Roadmap for eHealth in Lebanon - Hospital Readiness Survey" was sent out to stakeholders including hospital staff, Information Technology (IT) staff and third-party payers' staff. Below is a summary of the responses obtained under the major sections.

Table 3: Respondents characteristics

Participant's role/affiliation	N	Percentage
Hospital staff (Physicians, Nursing, Administration...)	**14**	**19.7%**
Information Technology staff (IT staff, IT Leadership...)	**31**	**43.7%**
Private Payers (Insurance, Social organizations...)	**26**	**36.6%**
Total	**71**	**100%**

Table 4: EHR current Status in Lebanese Health Institutions

EHR Current Status	Percentage
Organization has an EHR	**32%**
Organization uses electronic internet billing with insurance companies	**35%**
Organization has an online communication methods/tools with patients	**47%**

Table 5: Organizational alignment

Organizational Alignment	Percentage
Organization has a plan to implement an EHR or any other eHealth projects	**35%**
Senior management views EHR as key to meeting future organizational goals	**90%**

Table 6: Operational & Technology Readiness

EHR Current Status	Percentage
Organization identifies ways in which EHR can improve current workflow and Processes	**58%**
Top-level executives are prepared to upgrade hardware (if required) to ensure reliability of an EHR system performance	**66%**

Table 7: Awareness of eHealth issues

Overall Rate	Advanced to very advanced	Average	More education is needed	No awareness at all
Level of awareness of, and knowledge about eHealth among health professionals at the organization	**41%**	**30%**	**27%**	**6%**

General Meeting

More than a hundred stakeholders attended a general meeting representing different governmental and private institutions including the syndicate of private hospitals, order of physicians, order of nurses, order of pharmacists, Internal Security Forces, State Security Forces, General Security Forces, the Lebanese Army, third-party payers and software providers.

The meeting was moderated by Mr. Joe Wakim and Dr. Ghassan Hamadeh. A presentation of the purpose of the project was made then followed by experts' opinions and a general discussion. Presentations are attached as Appendix 6 and are available online at https://aub.edu.lb/fm/CME/Pages/EHR-Readiness.aspx

The presentations covered the following issues:

- **PSO Initiative is an opportunity for Lebanon to move forward with eHealth**
    - The objective is to work together to ultimately provide Care Continuity to citizens.
    - We have gathered as many stakeholders as possible through the "EHR Readiness" chapter to promote collaboration, to learn from others and each other to save valuable time and money…
- **HIMSS Middle East is a good model to follow, it can help elevate gradually the level of care across Lebanon by;**
    - Providing safer clinical practices through automations such as "Closed loop medicine administration".
    - Promoting the exchange of information within and across organizations
    - Making use of advanced analytics for operations and research
    - Population health initiatives …
- **Interoperability standards we should seek to adopt include:**
    - Messaging formats such as HL7, FHIR, DICOM, IHE, …
    - Clinical codes and documentation such as: IDC, CPT, SMOMED, Consolidated-Clinical Document Architecture C-CDA to facilitate the meaningful exchange of information
    - Quality Clinical metrics: Quality Reporting Document Architecture QDRA a standard for communicating health care quality measures, …
    - Security and confidentiality: OpenID and OAuth for identity and authorization, data encryption, HICP, …
- **Return on Investment**
    - Clinical; standardize quality care workflows, evidence-based practices, clinical decision support, reduce re-admission, reduce unneeded harmful tests…
    - Financial; reduce duplication, waisted efforts, lost revenue, better analytics and visibility for planning, …
- **Change management**
    - We need to work together to build a sustainable Governance model
    - We need to engage and promote collaboration, align efforts to achieve the Ministry's vision for Lebanese citizens and residents.
    - We can create a communication platform though the MOPH to keep everyone on the same page and engaged, …
- **Infrastructure readiness**
    - Connectivity, national network, internet, …
    - Data Centers, Servers, high availability, backups, disaster recovery, …
    - Facilities, Network, End User Devices, …
    - Security, encryption, patching, upgrades, …

Dr. Yousef Bassim presented the results of the survey and compared them to a previously executed similar survey in 2012. The critical finding was that in 2019 health institutions in Lebanon are better equipped and readier to adopt EHR both at the level of acceptance and technical readiness. The only barrier is the cost for implementation and change management for human resources. Therefore, Dr. Bassim stressed on the benefits of EHR implementation and return of investment of such project that would outweigh the barriers.

Mr. Karim Hatem presented the eHealth experience in Europe. In his presentation Mr. Hatem highlighted examples of eHealth disruptive and outstanding strategy implementations in terms of content, organization and governance in few European Countries: France, Estonia, Luxembourg, Monaco, and Denmark. The key take home messages from each country are:

- In France, a unique system is adopted for the entire population (12 million people).
- In Estonia, The Digital Health system is part of online public services « e-Estonia » which relies on a unique identifier for a large array of functionalities: tax declaration, business records, online elections and cyber schools.
- In Luxembourg, a dedicated eHealth agency, legislated by the social security code, has been set up to ensure better use of information in the health sector and the medico social sector in order to allow better coordinated patient care.
- In Denmark, standards were first defined then hospitals were given the choice to purchase the system from the available 15 providers. Later, it was required that all health institutions in each region adopt the same system in order to have one clinical pathway per region.
- In Monaco one of primary objectives for implementing the eHealth strategy was to attract medical tourism.
- As for Lebanon, shifting to EHR will be a radical transformation of the practices and processes of healthcare professionals; therefore, adequate time should be first allocated for adaptation and investment. Then, once this period is over, the benefits in time saving and efficiency gain will be huge.

Mr. Ghassan El Lahham shared Jordan's eHealth experience of adopting Hakeem program in 2009. Hakeem was the first initiative for computerizing Jordan's health sector, and it aimed to deploy EHR in Jordan's health sector civil and military hospitals and clinics. The observed benefits of computerizing the health sector in Jordan were: reducing operating costs, supporting research & decision making, improving patient experience, improving health care services, and reducing medical errors.

Mr. Ali Romani updated the audience on the MoPH planned upgrade of all its applications to meet international standards of interoperability. For instance, MoPH developed a platform to build EPI registry for every child, the platform receives data from various sources: MERA; PHENICS; Birth registry. In addition, Mr. Romani gave an overview of PHENICS, a platform that is currently adopted at the level of primary healthcare network in Lebanon (175 centers out of 220 centers).

A discussion followed and several **priority action steps** were discussed including:

- The continuity of this project
- Data security and confidentiality
- Change Management/Training for stakeholders, users and patients.
- Cost/funding
- One or multiple options form EHR solution
- Data storage

Take away messages were:

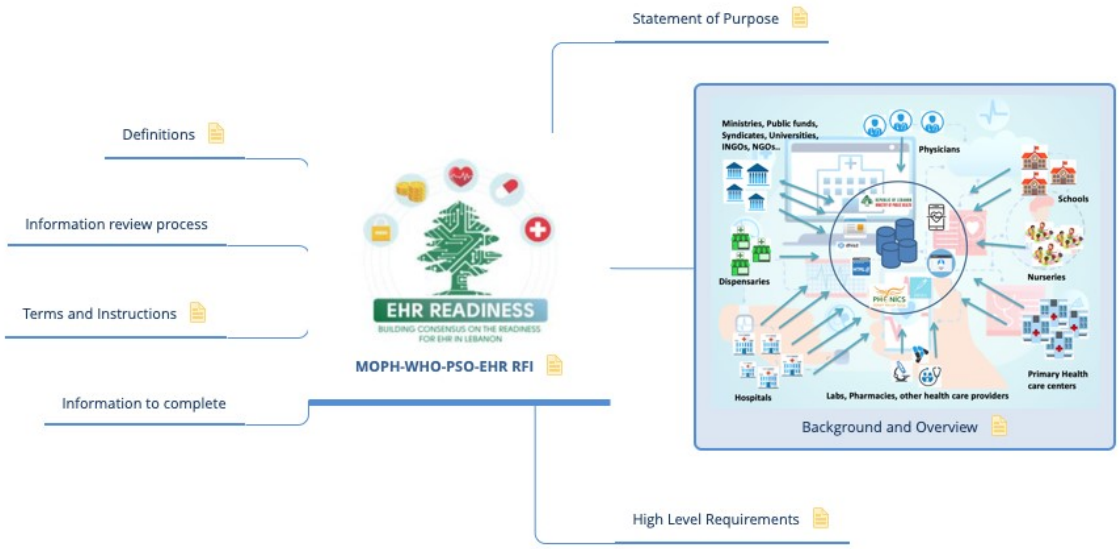
- We need to collaborate and consolidate efforts to achieve the eHealth vision one step at a time
- We need to adopt common standards and legislations to deliver high quality care
- It's everyone's responsibility

The next steps agreed upon to be followed after the general meeting were:

- Agreeing on the composition of a Governing Body/Entity that will be responsible for overseeing and ensuring the continuity of this project
- Deciding on the framework for generating a unique patient identifier at the national level
- Developing a request for information (RFI) document to be used by MoPH

Section Three: Model Request for Proposal / Information

A model Request of Information (RFI) document for MoPH and private hospitals for use to solicit offers from EHR vendors as an applied useful tool.
[This document/template should be edited as necessary prior to release]



The Ministry of Public Health (MoPH) intends to initiate an Electronic Health Records (EHR) project aimed at launching the generalization of a state-of-the-art EHR as an instrument to transform quality of care and system intelligence across public health institutions.

EHR Goals include;

- Providing any health care provider, a spontaneous and secure access to a patient's medical record when necessary and with due respect to patient's privacy.
- Allowing exchange of medical, service and financial information among health care providers, insurers and administrators with minimal technical limitations and due respect to patients' privacy and information exchange security.
- Allowing the MOPH and health institutions to collect medical information for planning and delivering services with due respect to patients' privacy and information exchange security.

1. Statement of Purpose

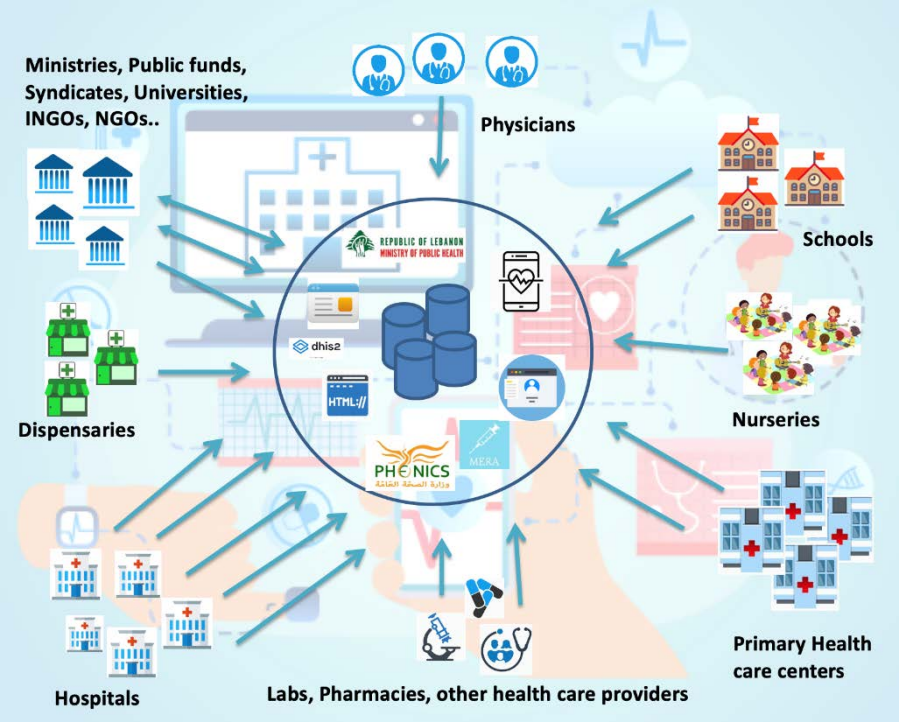
The purpose of this Request For Information (RFI) is to gather information about Electronic Healthcare Records (EHR) solutions and the implementation service needed to accelerate the adoption of health information technology in public health centers to standardize and improve the quality and safety of healthcare services.

The EHR solutions and proposed should be capable of serving all public healthcare institutions. This includes but not limited to the automation of services provided by the Ministry of Public Health (MoPH), Dispensaries, Schools, Nurseries, Hospitals, Primary care centers, Laboratories, and Pharmacies.

Solution providers should preferably propose one tightly integrated solution capable of health information exchange with the private healthcare sector though the use of international standards.

Solution providers are also expected to share their experience in implementing large scale solutions and health transformation journeys. They should also be ready to prepare presentations, demos and proofs of concepts as requested by the IT steering committee.

2. Background and Overview



The MoPH is currently facing many challenges due to the lack of a unique national identifier, the use of different coding systems, different data structures, different technologies and the weak adoption of standards and terminologies.

Over the years, despite the challenges, the MoPH teams were able to implement a number or systems to capture healthcare related data such as:
billing, death registry, births registry, maternal mortality, Implantable devices tracking system, communicable diseases reporting, and other systems and reports.

Currently the solution implemented serve 144 Primary Health Care Centers (PHCC) out of 220 PHCC. Centers are connected via VPN to the MOPH hosted solutions.

Details related to MoPH facilities should be provided here	
Number of facilities, locations	
Types of Facilities	
Typical data needed	
Number of inpatient beds	
Number of inpatients / year	
Number of outpatients / year	
Number of Emergency visits / year	
Number of operating rooms	
Number of physicians (headcount)	
Number of registered nurses (headcount)	
Number of staff (full time equivalents)	
Number of registered allied health professionals (headcount)	
Number of IT staff (full time headcount)	
IT operating expense (% of yearly budget)	
Number of computer workstations	
Number of mobile workstations or devices	

The Implementation of a state-of-the-art integrated EHR is the key to providing a transformative and visible leap in standardizing the quality of care and intelligence provided on a national level.

To be truly transformative, a national EHR can provide citizens with connected healthcare services enabling:

- Improved overall healthcare services provided to patients nationally.
- Improved quality, safety, and efficiency of care while reducing disparities and waist.
- More engaged patients and families to improve care outcomes.
- Bid data analysis to promote population health initiatives.
- Improved care coordination within and across institutions to provide care continuity.
- Improved privacy and security of healthcare data.

The success of this digital transformation journey is dependent on the engagement of all stakeholder and the setting of common national objectives for the benefit all citizens.

3. High Level Requirements

Solution providers are expected to share information that demonstrates their EHR's capability related to:

3.1. EHR Modules / Features

Share information and features related to the sample modules listed.
Check all modules or feature is available in your EHR by placing an [X].
Add to the lists of modules and features based on what is available in the your EHR.
Provide links to additional resources and use cases.

3.1.1. *Ambulatory care*

Provide information related to ambulatory clinics module and features e.g.:

[ ] Family Medicine
[ ] Oncology
[ ] Cardiology
[ ] Dermatology
[ ] Nephrology
[ ] Endoscopy
[ ] Gastroscopy
[ ] Bronchoscopy
[ ] Surgery
[ ] Neurology
[ ] Psychiatry
[ ] Pediatrics
[ ] Otolaryngology
[ ] Ophthalmology

List all other specialties and features supported by your EHR:

3.1.2. *Admissions*

Provide information related to the admission module features e.g.:

[ ] Admission requests management
[ ] Bed management
[ ] Bed reservations
[ ] Admission process
[ ] Transfers process
[ ] Discharges process
[ ] Financial clearance (specify level of integration with Third party payers)

List all other features supported by your EHR:

3.1.3. *Advanced Analytics*

Describe reporting and analytics capabilities e.g.:

[ ] Build executive report, dashboards with visualizations such as charts, ...

[ ] Build quality management reports

[ ] Build ad-hoc reports from clinical data repository and data-warehouse

[ ] Provide users with self-service tools to build reports and dashboard

[ ] Ability to use artificial Intelligence or machine learning algorithms to provide predictive analytics and clinical decision support services

List all other features supported by your EHR:

3.1.4. *Blood Bank*

Provide information related to the blood bank module features e.g.:

[ ] Blood products management

[ ] Quality

[ ] Orders processing

[ ] Orders dispensing

List all other features supported by your EHR:

3.1.5. *Cardiology*

Provide information related to cardiology workflow from receiving orders to the diagnosis and documentation of findings in the EHR e.g.:

[ ] Receiving orders

[ ] Scheduling patients to modalities based on request

[ ] Generating the modality work-list to display at each modality

[ ] Cardiologist work-list

[ ] Integration with imaging tools for taking measurements and diagnosis

[ ] Templates for reporting

[ ] Reporting critical results

List all other features supported by your EHR:

3.1.6. *Clinical Documentation*

Provide information related to all documentation features available to multidisciplinary teams e.g.:

[ ] Allergies

[ ] Allergic reactions

[ ] Medication lists, current and past

[ ] Medication reconciliation

[ ] Bar Code Medical Administration (BCMA)

[ ] Electronic Medication Administration Records (eMAR)

[ ] Problem list

[ ] View lab results, ranges and alerts

[ ] Reports, radiology, cardiology, others

[ ] linking to medical images located on a VNA/PCAS ((specify level of integration))

[ ] Store Non-DICOM images

[ ] Patient assessments

[ ] Multidisciplinary notes, Physician, Nursing, ...
[ ] Speech recognition (specify level of integration)
[ ] Capture structured data
[ ] Customizable templates
[ ] Consultation notes
[ ] Chronic disease management
[ ] Scan external records
[ ] Code using standards terminologies, ICD, CPT, SNOMED, LOINC, ...
[ ] Advance directives
[ ] Health maintenance advisories
[ ] Immunizations record
[ ] Blood pressure
[ ] Height, weight
[ ] I&O Flowsheets
[ ] Outside primary care provider
[ ] Consultants who provide continuity care
[ ] Referrals to specialty physicians
[ ] Current patient location (home, inpatient, room number)
[ ] Preferred pharmacy
[ ] Do Not Resuscitate (DNR), legal consent
List all other features supported by your EHR:

3.1.7. *Clinical Data Repository (CDR) and Data Warehouse*

Provide information related to the clinical data repository e.g.:
[ ] solution has unified clinical data repository
[ ] solution has a data warehouse that can include clinical and non-clinical data
List all other features supported by your EHR:

3.1.8. *Clinical Decision Support (CDS)*

Provide information related to clinical decision support features e.g.:
[ ] Drug Drug/Food/Allergy/Labs interactions
[ ] Alerts (e.g. behavior, infection, clinical research study participation)
[ ] Notification of primary care provider when patient admitted, discharged, seen in emergency department
[ ] Eligibility for clinical trials
[ ] Documentation triggered decision support advisories
List all other features supported by your EHR:

3.1.9. *Computerized Physician Order Entry (CPOE)*

Provide a list of all types of orders including but not limited to;
[ ] Medications
[ ] Blood products
[ ] Laboratory
[ ] Pathology
[ ] Imaging studies

[ ] Procedures, minor and major surgeries
[ ] Consultations
[ ] Physiotherapy
[ ] Dietary
[ ] Nursing activities
[ ] Human milk
List all other types supported by your EHR:
Describe the level of integration between orders and other systems (specify level of integration):

3.1.10. *Emergency Department*

Provide information related to the features typically used in the emergency department e.g.:
[ ] Quick registration
[ ] Triage
[ ] Financial clearance (specify level of integration with Third party payers)
[ ] Initiating stat orders
[ ] Initiating order sets based on clinical decision support rules
[ ] Multidisciplinary documentation
[ ] Receiving data from ambulance services (specify level of integration)
[ ] Handling transfers from other healthcare facilities (specify level of integration)
List all other features supported by your EHR:

3.1.11. *Imaging*

Provide information and features related to imaging studies reporting and viewing of images e.g.:
[ ] imaging modalities work-list management
[ ] Radiology reporting
[ ] Cardiology reporting
[ ] Bone mineral density reporting
[ ] Vascular studies reporting
List all other features supported by your EHR.
Share integration options to launch imaging viewer to browse images from VNA or PACS:

3.1.12. *Intensive Care*

Provide information and features related to critical care units e.g.:
[ ] Intensive care unit management
[ ] Cardiac surgery unit management
[ ] Coronary care unit management
[ ] Neonatal Intensive care unit management
[ ] Integration with medical devices/monitors for filing vitals to the EHR (specify level of integration)
List all other features supported by your EHR:

3.1.13. *Laboratory*

Provide information related to laboratory services from the collection of specimens by phlebotomists to the automated analysis and resulting to the electronic chart e.g.:

[ ] Integration with order entry to receive all requests electronically
[ ] Generation of work-lists for phlebotomists
[ ] Use of mobile device for collection
[ ] Verification of identity at the collection point using barcode or RFID
[ ] Printing of labels at the point of care
[ ] Automatic receiving at the Laboratory
[ ] Integration with Laboratory instruments, sorters, analyzers, ...
[ ] Quality control rules
[ ] Automatic verification and display in EHR
[ ] Reporting critical results

List all other features supported by your EHR:

3.1.14. *Mobile Devices Applications*

Provide information related to EHR features available through mobile application e.g.:

[ ] Physician application
[ ] Nursing application
[ ] Patient application
[ ] Phlebotomist application
[ ] Housekeeping application

List all other application supported by your EHR:

3.1.15. *Obstetric Care*

Provide information and features related to obstetric care e.g.:

[ ] Pregnancy tracking
[ ] Ultrasound imaging
[ ] IVF management

List all other features supported by your EHR:

3.1.16. *Oncology*

Provide information and features related to oncology cases management e.g.:

[ ] Use of oncology protocols
[ ] management of short stay infusion encounters

List all other features supported by your EHR:

3.1.17. *Operating Rooms*

Provide information and features related to operating rooms management e.g.:

[ ] Surgery scheduling
[ ] OR staff scheduling
[ ] Anesthesia scheduling
[ ] Integration with anesthesia monitors
[ ] Documentation of supplies used.
[ ] Documentation of Implantable devices

[ ] Documentation of sterile instruments used
[ ] Documentation of surgical procedures performed
List all other features supported by your EHR:

3.1.18. *Patient Portal*

Provide information and features regarding self-service features available to patients e.g.:
[ ] Web portal access
[ ] Mobile phone application access
[ ] Make appointments
[ ] Receive results
[ ] View education material
[ ] Communicate with healthcare providers
[ ] Share results
[ ] View dependents and parents' charts
List all other features supported by your EHR:

3.1.19. *Patient Registration*

Provide information and features related to patient registration e.g.:
[ ] Search existing patients
[ ] Add or update patient demographics
[ ] Arabic support
List all other features supported by your EHR:

3.1.20. *Pharmacy*

Provide information and features related to pharmacy management e.g.:
[ ] Closed loop medication administration management
[ ] Drug inventory management
[ ] Formulary management
[ ] Outpatient prescriptions management
[ ] Connection with pharmacies (specify level of integration)
List all other features supported by your EHR:

3.1.21. *Radiology*

Provide information and features related to radiology workflows from receiving orders to the diagnosis and documentation of findings in the EHR e.g.:
[ ] Receiving orders
[ ] Scheduling patients to modalities
[ ] Generating modality work-list
[ ] Generating radiologists work-list based on specialty and radiologist preferences
[ ] Integration with imaging tools for diagnosis (specify level of integration)
[ ] Build custom templates for reporting
[ ] Report critical results
[ ] Residents workflow
[ ] Teaching studies
List all other features supported by your EHR:

3.1.22. *Security and Audit Trails*

Provide information related to the security and auditing features e.g.:

[ ] Configure security roles

[ ] Integrate with the Microsoft Active Directory (specify level of integration)

[ ] Use of multi-factor authentication

[ ] Full audit trails for users and patients

[ ] Support for GDPR and HIPAA

List all other features supported by your EHR:

3.1.23. *Scheduling*

Provide information and features related enterprise scheduling e.g.:

[ ] Admissions scheduling

[ ] Procedures scheduling

[ ] Treatment scheduling

[ ] Operating rooms scheduling

[ ] Ambulatory clinic appointments scheduling

[ ] Booking resources such as medical devices

[ ] Cross checking for overlaps across all types of appointments

List all other features supported by your EHR:

3.1.24. *List Third Party Solution Needed*

List all third-party solutions or content required to have a complete solution:

3.2. Interoperability

The clinical terminology standards are increasingly being required for Interoperability initiatives. There are a lot of different standards out there, they tend to be specific to clinical practice or workflow processes.

Indicate which of the below Interoperability standards are supported by your EHR solution and add others supported:

Medical terminologies / coding standards:

[ ] ICD

[ ] CPT

[ ] DRG

[ ] SNOMED

[ ] LOINC

[ ] Intelligent Medical Objects

[ ] ... List others

Integration with drug database solutions such as:

[ ] First Databank

[ ] Multum

[ ] Micromedex

[ ] Medi-Span

[ ] ... List others

Communication messaging standards:
[ ] HL7 (version: _____)
[ ] HL7 FHIR (version: _____)
[ ] DICOM (version: _____)
[ ] CDA (version: _____)
[ ] ... List others

Devices integration:
[ ] IEEE 1073 standard
[ ] Vital signs monitors
[ ] Laboratory equipment
[ ] Critical care monitors
[ ] Anesthesia monitors
[ ] ... List others

Solutions integration:
[ ] Billing
[ ] EHRs in other institutions
[ ] Imaging solutions, PACS, CVIS, ...
[ ] Clinical registries
[ ] Pharmacies
[ ] Third Party payers
[ ] ... List others

Describe the ability and requirements to exchange information with other healthcare facilities.
[The need for third party integration engines]

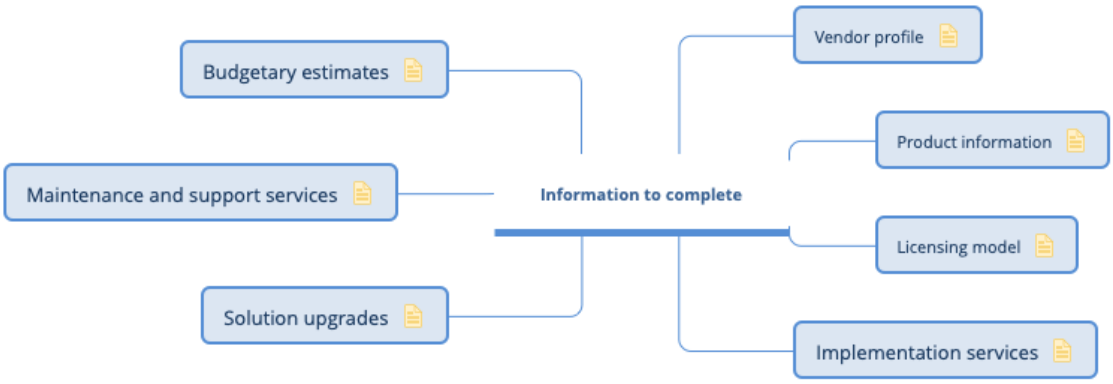
3.3. Infrastructure Requirements

Provide information and features related to the solution infrastructure e.g.:
[ ] Solution architecture diagram
[ ] Redundancy features, backup, disaster recovery
[ ] Cloud hosting
[ ] On-premises hosting

Include information related to typical:

- Storage requirements:
- End user devices specification:

4. Information to complete



4.1. Vendor Profile

Solution providers must fill the "1. Vendor Profile" table with information about their company and the company that built the solution if different. Response to a specific item may be submitted as attachments if necessary.

Vendor Profile

A. General	
Name	
Address (Headquarters)	
Address Continued	
Main Telephone Number	
Solution provider Vision	
B. Parent Company (if applicable)	
Name	
Address	
Address Continued	
Telephone Number	
C. Main Contact	
Name	
Title	
Address	
Address Continued	
Telephone Number	
Fax Number	
Email Address	
D. Company details (Product provider)	
Website	
Publicly Traded or Privately Held	
What is the percentage of revenue that is re-invested in Research and Development of the EHR solution proposed?	
List the mergers or acquisitions undergone in the last five years	
Share the KLAS ranking of the product for the last 3 years if available	

Provide a list of any awards received for the product offered.	
Total FTEs	
Number of offices worldwide, please list countries	
Number of after sales support staff covering the Middle East	
E. Market Data	
Number of years as an EHR vendor	
Number of live sites on the solution proposed	
Number of new EHR installations in the last 3 years	
Number of vendor-provided installs vs. install by third party companies	
Is the product installed in Lebanon?	
If yes, list the sites by specialty and size	
List of customers of similar size	
List of other references	

4.2. Product Information

Solution providers must fill section A of the "2. Product Information" table with information about their EHR product. Response to a specific item may be submitted as attachments if necessary.

Product Information

A. Product Information	
Product name and version#	
When will the next version be release?	
Is it based on a single database?	
Is the product composed on multiple integrated modules or interfaced modules?	
List all modules, their current version, and provide additional documents with all technical specifications, dependencies for each module to operate fully with the "core" product.	
List EHR Certification(s)	
Describe the vision and future development of the product proposed.	
Describe the products scalability and its capability to serve all the citizens.	
Describe the solution capability to lead the customer to apply form HIMSS 6 or 7	

4.3. Licensing Model

Solution provider should clearly describe the licensing model by filling section B of the "2. Product Information". Response to a specific item may be submitted as attachments if necessary.

B. Licensing	
How is the product licensed?	
Are licenses purchased per user?	

Define ‘user’ if it relates to the licensing model (i.e., FTE MD, all clinical staff, etc.).	
How does the licensing account for residents, part time clinicians?	
Can user licenses be reassigned when a workforce member leaves?	
If licensing is determined per workstation, do handheld devices count towards this licensing?	
Is system access based on individual licensing, concurrent, or both?	
What does each license actually provide?	
For module based systems, does each module require a unique license?	
In concurrent licensing systems, when are licenses released by the system (i.e., when the workstation is idle, locked, or only when user logs off)?	

4.4. Implementation Services

Solution provider should clearly describe the Implementation methodology by filling section C of the "2. Product Information". Response to a specific item may be submitted as attachments if necessary.

C. Implementation services	
Describe the types of implementation services available.	
Describe the Implementation methodology, including but not limited to; key decision, team training, scoping, configuration, change management, communication, user engagement and training.	
Describe the staffing requirements, from the solution provider and client side, including but not limited to; number of members needed, qualification and skills.	
Describe the types of customization services available, including estimate cost per man day.	
Share sample timelines based on defined scopes of past implementations.	

4.5. Solution Upgrades

Solution provider should clearly describe the upgrade methodology and services by filling section D of the "2. Product Information". Response to a specific item may be submitted as attachments if necessary.

D. Upgrade Process	
Will customer get to choose which upgrades they want?	
Frequency of Upgrades?	
How long can a customer delay an upgrade without losing support?	
Will training be provided for new functionality?	
Describe the extent to which the customer's team can handle the upgrades.	

4.6. Maintenance and Support Services

Solution provider should clearly describe the Maintenance and support services by filling section E of the "2. Product Information". Response to a specific item may be submitted as attachments if necessary.

E. Support and Maintenance	
Describe the maintenance, support models available, including but not limited to inclusions, exclusions and the Service Level Agreement (SLA).	
Describe the process and typical time required for responding to requests for custom changes.	
Provide information about the customer community, including but not limited to forums for customers to interact, annual user group meetings, conferences.	
Describe the extent to which the customer's team can handle configuration changes.	

4.7. Budgetary Estimates

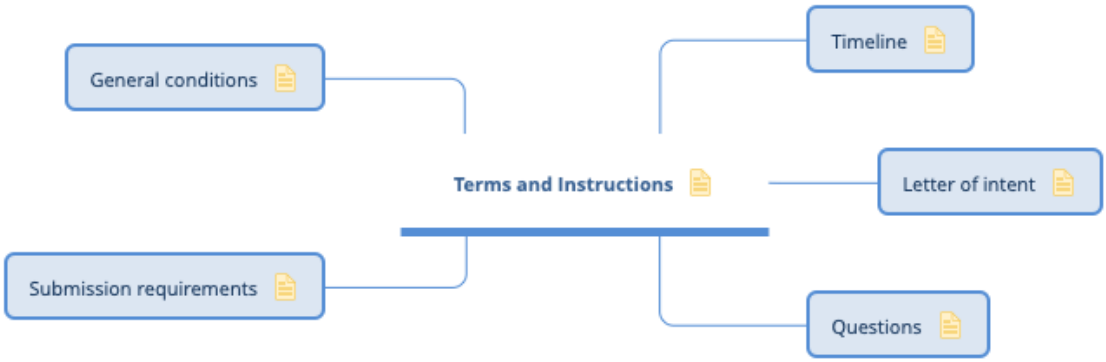
Solution provider should provide the budgetary estimates by filling "3. Budgetary estimates". Response to a specific item may be submitted as attachments if necessary.

Budgetary estimates

Solution provider should share budgetary estimates for:

		Year1	Year2	Year3	Year4	Year5	Year6	Year7
Capital Expenditures EHR only	**Totals (calculated)**							
Software Licenses	$ -							
Solution provider's implementation services	$ -							
Average customization services	$ -							
Customer's team training/travel/logging/logistics	$ -							
Infrastructure hardware, server, storage, backup	$ -							
End User Devices, PCs and peripherals	$ -							
Operational Expenditures EHR only								
Software support and maintenance (including updates and upgrades)	$ -							
Infrastructure hardware maintenance and support, server, storage, backup	$ -							
Total								
Overall annual cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

5. Terms and Instructions



- How to respond to this RFI?
- Solution providers are expected to respect the below instructions and dates listed in the Timeline.
- Solution providers must submit responses to this RFI in electronic format by the date indicated in the Timeline. e.g. PDF, Word, Excel, PowerPoint.
- Submissions should be sent to .....@.....
- with the subject line: “EHR-20XX-Submission"
- Receipt will be acknowledged via Email.
- Late proposals may not be reviewed.

5.1. Timeline

[The below Timeline should be adjusted based on the scope of the RFI]

- Intent to respond - XX days from the RFI issue date.
- Last written questions - XX days from the RFI issue date.
- RFI responses expected - XX days from the RFI issue date.
- Demos requested - XX days from the RFI issue date.

5.2. Letter of intent

- All interested solution providers must email their intent to respond to this RFI by the date indicated in the Timeline.
- The Email should be sent to xyz@moph.gov.lb with the subject line: "MOPH-WHO-PSO-EHR-20XX-Intent"
- Receipt will be acknowledged via Email.

5.3. Questions

- All inquiries regarding this RFI are encouraged and welcome.
- The opportunity to answer questions from solution providers shall be accepted until the date listed in the Timeline.
- All questions should be sent by email to xyz@moph.gov.lb with the subject line: "MOPH-WHO-PSO-EHR-20XX-Questions".
- Receipt will be acknowledged via Email.

5.4. Submission requirements

Solution provides shall organize their proposals as defined below to ensure consistency and to facilitate the review of all information submitted.

All the sections listed below must be included in the submission, in the order presented, with the Section Number listed. The responses shall be submitted in the following format:

Section 0 – Executive Summary (provide a concise summary of the solution and services proposed)
Section 1 – Vendor Profile (provide answers using the template provided)
Section 2 – Product Information (provide answers using the template provided)
Section 3 – Cost of Ownership (provide answers to the questions provided)
Section 4 – Capabilities to meet the requirements: responses to checklists and statements that demonstrates the solution provider's ability to deliver the required EHR solution and implementation services:

A. List of modules and features available (Fill check list under "High Level Requirements" providing sporting documentation as needed)
B. Provide evidence of successful implementations of similar scale. (Reference list)
C. Their knowledge and understanding of the Lebanese public healthcare sector and its strategy. (statement summarizing the solution provider's research of the Lebanese healthcare environment)

5.5. General conditions

- MOPH is not obligated to any course of action as the result of this RFI. Issuance of this RFI does not constitute a commitment by the MOPH to award any contract.
- MOPH is not responsible for any costs incurred by solution providers or their partners in the RFI response preparations or presentations.
- Information submitted in response to this RFI will become the property of MOPH. All responses will be kept private from other solution providers.
- The MOPH reserves the right to modify this RFI at any time and reserves the right to reject any and all responses to this RFI, in whole or in part, at any time.

6. Information review process

6.1. Questions to vendors

The IT steering committee will review all information provided by the solution providers and may invite them to question and answer sessions.
Answers to questions should be provided within a reasonably defined time.

6.2. Use cases for Demos

Solution providers are expected to review the below sample scenarios and indicate the extent to which they can prepare demonstrations.
[ ] Fully capable, can easily be configured
[ ] Partially capable, needs customization
[ ] Partially capable, cannot be customized
[ ] Not capable

A. Two patient visit the emergency department with acute complaints:

- Patients are triaged, one has an ID, the second needs to be registered this facility.
- Patients are admitted to the ED.
- Based on the triage and assessments, clinical decision support rules propose a set of orders or care plan.
- Orders are placed, e.g. labs, radiology.
- Orders are financially cleared with payers.
- Physician and nursing notes are documented in the EHR. Structured and non- structured.
- Results of studies performed are directly reported back into the electronic chart, e.g. radiology, labs.
- Consultations are requested and documented in the electronic chart.
- One patient is discharged home with discharge instructions and prescriptions and a follow-up appointment.
- One patient is admitted to the hospital.
- Education material is provided to both patients.

[ ] Fully capable, can easily be configured
[ ] Partially capable, needs customization
[ ] Partially capable, cannot be customized
[ ] Not capable

B. Patient is admitted to the hospital:

- Admission orders are made
- Nursing work list is generated and viewed
- History and physical is documented
- The patient is entered into a research protocol
- Studies are ordered
- Diet is ordered
- Consultations are requested
- Vitals are captured

- Progress notes are documented
- STAT/PRN/Scheduled Medications are ordered
- Medications are prepared/dispensed
- Medications are administered, bedside verification is used
- An allergy occurs and is documented
- Medications are lost/vomited
- A surgery is scheduled
- Patient is prepared for O.R.
- The patient is anesthetized
- Surgery is performed and documented
- Surgical supplies are charges to the patient's account
- The patient is transferred to recovery
- The patient's recovery is documented
- The patient is transferred to a new room
- The patient is discharged
- The patient is billed (private insurance/governmental insurance/cash payer)
- A discharge summary is generated
- The patient's primary care physician is sent the documentation electronically or provided with access
- An outpatient appointment is scheduled

[ ] Fully capable, can easily be configured
[ ] Partially capable, needs customization
[ ] Partially capable, cannot be customized
[ ] Not capable

C. Patient follows up in an outpatient clinic:

- Patient arrives to the clinic
- The initial assessment is completed
- Patient is seen by Physician
- Assessments and a progress notes are documented by nurses and physician
- Growth charts are generated and viewed (if pediatric)
- Medications are prescribed (including the one the patient is allergic to)
- A minor procedure is performed and documented
- Health maintenance reminders are triggered
- A referral is made to a specialist
- A follow up appointment is scheduled

[ ] Fully capable, can easily be configured
[ ] Partially capable, needs customization
[ ] Partially capable, cannot be customized
[ ] Not capable

D. Patient makes use of the patient portal:

- All types of results posted are viewable from a web page and a mobile application
- An appointment is taken online

- The patient is able to ask follow-up questions
- The requests access to dependents' or parents' charts and views them
- Education material related to the patient's problems are available

[ ] Fully capable, can easily be configured

[ ] Partially capable, needs customization

[ ] Partially capable, cannot be customized

[ ] Not capable

7. Definitions

Solution Provider	*The entity proposing the EHR product and its parent or partner.*
Product	*The EHR solution with all its module.*
Interoperability	*The ability of clinical or patient data to transfer between providers in various settings and their various software packages. If a physician's EMR is not interoperable, physicians would only be able to access information within their own EMR application's database.*
Clinical Data Repository	*A database acting as an information storage facility. Although often used synonymously with data warehouse, a repository does not have the analysis or querying capabilities of a warehouse.*
Computerized provider order entry (CPOE)	*A process of electronic entry of provider instructions for the treatment of patients. Orders for pharmacy, laboratory, radiology, and treatment protocols are communicated over a computer network to the medical staff or to the departments responsible for fulfilling the order.*
Health information technology	*The hardware and software used to store, retrieve, share, and use clinical information to treat patients effectively.*
CPT Codes	*AMA's list of clinical procedures used for administrative documentation and billing. There are over 8,000 codes in the CPT dictionary. More information on AMA's CPT Codes.*
CDS (Clinical Decision Support)	*Clinical decision support systems (CDSS) assist the physician in applying new information to patient care and help to prevent medical errors and improve patient safety. Many of these systems include computer-based programs that analyze information entered by the physician.*
CDA (Clinical Document Architecture)	*Provides an exchange model for clinical documents and brings the industry closer to the realization of an electronic medical record.*
Data Warehouse	*A large database that stores information like a data repository but goes a step further, allowing users to access data to perform research-oriented analysis.*
Fast Healthcare Interoperability Resources (FHIR®)	*Is the newest standard from Health Level Seven International (HL7®).*
HL7	*HL7 and its members provide a framework (and related standards) for the exchange, integration, sharing, and retrieval of electronic health information. These standards define how information is packaged and communicated from one party to another, setting the language, structure and data types required for seamless integration between systems. HL7 standards support clinical practice and the management, delivery, and evaluation of health services, and are recognized as the most commonly used in the world.*

Appendix 1: Healthcare Interoperability Glossary

Online sources of this glossary

https://corepointhealth.com/resource-center/healthcare-interoperability-glossary/
https://www.ehealth.fgov.be/fr/esante/lexique/lexique
https://www.e-health-suisse.ch/fr/header/glossaire.html

Blue Button	*The Blue Button initiative was first introduced by the VA, and subsequently began being promoted by many healthcare vendors. VA's Blue Button allows a patient to access and download their information from a personal health record (PHR) into a very simple text file or PDF that can be read, printed, or saved on any computer. This enables patients to share this data with their health care providers, caregivers, or other people they trust.* *The downloaded format is not in an industry standard format, such as CCD or CCR, which makes it less interoperable from an EHR-to-EHR sharing standpoint. The downloaded file is more targeted for human viewing and sharing.*
CCD	*Continuity of Care Document (CCD) The HL7 CCD is the result of a collaborative effort between the Health Level Seven and American Society for Testing Materials (ASTM) to "harmonize" the data format between ASTM's Continuity of Care Record (CCR) and HL7's Clinical Document Architecture (CDA) specifications.*
CCHIT	*Certification Commission for Healthcare IT (CCHIT) serves as the recognized US certification authority for electronic health records (EHR) and their networks. In September 2005, CCHIT was awarded a 3-year contract by the U.S. Department of Health and Human Services to develop and evaluate the certification criteria and inspection process for EHRs and the networks through which they interoperate. CCHIT serves one of the ONC-ATCB for electronic health record (EHR) certification. CCHIT was certified by the ONC on September 3, 2010 and is authorized to certify complete EHR and EHR modules.*
CCOW	*Clinical Context Object Workgroup (CCOW) is an HL7 standard protocol designed to enable disparate applications to synchronize in real-time and at the user-interface level. It is vendor independent and allows applications to present information at the desktop and/or portal level in a unified way.*
CCR	*Continuity of Care Record (CCR) is an XML-based standard for the movement of "documents" between clinical applications. Furthermore, it responds to the need to organize and make transportable a set of basic information about a patient's health care that is accessible to clinicians and patients.*
CDA	*Clinical Document Architecture (CDA) HL7 CDA uses XML for encoding of the documents and breaks down the document in generic, unnamed, and non-templated sections. Documents can include discharge summaries, progress notes, history and physical reports, prior lab results, etc. HL7's CDA defines a very generic structure for delivering "any document" between systems. CDA was previously known as the Patient Record Architecture (PRA).*
CDR	*Clinical Document Repository (CDR) enables hospitals to build a life-long health record environment using stored health records for the purpose of better treatment, clinical research and health statistics for policy making.*

CHPL	*Certified Health IT Product List (CHPL) - The Office of the National Coordinator has organized a Certified Health IT Product List for Ambulatory and Inpatient facilities looking to purchase a complete EHR or EHR module certified for the Meaningful Use incentive program. Each complete EHR and EHR module listed has been certified by an ONC-ATCB and reported to the ONC for use in the list.*
DICOM	*Digital Imaging and Communications in Medicine (DICOM) is a common format for image storage. It allows for handling, storing, printing, and transmitting information in medical imaging.*
EDI	*Electronic Data Interchange (EDI) is a standard format for exchanging business data. The standard is ANSIX12, developed by the Data Interchange Standards Association. An EDI message contains a string of data elements; each represents a singular fact, such as a price, product model number, and is separated by delimiter. The entire string is called a data segment. One or more data segments framed by a header and trailer form a transaction set, which is the EDI unit of transmission (equivalent to a message). A transaction set often consists of what would usually be contained in a typical business document or form. The parties who exchange EDI transmissions are referred to as trading partners.*
EHR Dossier de santé électronique	*Electronic Health Record (EHR), as defined in Defining Key Health Information Technology Terms (The National Alliance for Health Information Technology, April 28, 2008): An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be created, managed, and consulted by authorized clinicians and staff across more than one health care organization.* Un dossier de santé électronique rassemble toutes les données cliniques et de santé d'une personne échangées entre les différents professionnels de la santé et le patient. Ces données sont accessibles indépendamment du temps et du lieu. Le dossier de santé peut contenir des éléments du dossier électronique du patient ainsi que d'autres données (p. ex., données personnelles liées à prévention, à l'alimentation ou à l'activité physique). Le détenteur d'un dossier de santé électronique détermine le contenu et les droits d'accès.
ELINCS	*The EHR-Lab Interoperability and Connectivity Standards (ELINCS) specification provides a profile that refines (or constrains) "standard" HL7 messages to moving lab results from reference labs to physician offices.*
EMR DME (dossier médical électronique)	*Electronic Medical Record (EMR), as defined in Defining Key Health Information Technology Terms (The National Alliance for Health Information Technology, April 28, 2008): An electronic record of health-related information on an individual that can be created, gathered, managed, and consulted by authorized clinicians and staff within one health care organization.*
Encryption Algorithm	*An encryption algorithm is a mathematical procedure for converting plaintext into ciphertext, which can be decoded back into the original message.*
FHIR	*An HL7 standard that is short for Fast Healthcare Interoperability Resources and pronounced "Fire". The standard defines a set of "Resources" that represent granular clinical concepts. The resources provide flexibility for a range of healthcare interoperability problems, and they are based on simple XML with an HTTP-based RESTful protocol where each resource has a predictable URL.*

Firewall	*Firewall refers to a hardware- or software-based method for controlling incoming and outgoing network traffic, based upon a predetermined rule set, to ensure that only trusted content is passed.*
Health IT Policy Committee	*Under the American Recovery and Reinvestment Act of 2009 (ARRA), The Health IT Policy Committee will make recommendations to the National Coordinator for Health Information Technology – ONC - on a policy framework for the development and adoption of a nationwide health information infrastructure, including standards for the exchange of patient medical information.*
Health IT Standards Committee	*The Health IT Standards Committee will make recommendations to the National Coordinator for Health Information Technology (HIT) on standards, implementation specifications, and certification criteria for the electronic exchange and use of health information. In developing, harmonizing, or recognizing standards and implementation specifications, the HIT Standards Committee will also provide for the testing of the same by the National Institute for Standards and Technology (NIST).*
HIE	*Health Information Exchange (HIE) focuses on the mobilization of healthcare information electronically across organizations within a region or community. HIE provides the capability to electronically move clinical information between disparate health care information systems while maintaining the meaning of the information being exchanged. The goal of HIE is to facilitate access to and retrieval of clinical data to provide safe, and efficient patient-centered care.*
HIPAA	*The Health Insurance Portability and Accountability Act (HIPAA) was enacted by the U.S. Congress in 1996. Title II of HIPAA, known as the Administrative Simplification (AS) provisions, requires the establishment of national standards for electronic health care transactions and national identifiers for providers, health insurance plans, and employers. This is intended to help people keep their information private, though in practice, it is normal for providers and health insurance plans to require the waiver of HIPAA rights as a condition of service.* *The Administration Simplification provisions also address the security and privacy of health data. The standards are meant to improve the efficiency and effectiveness of the nation's health care system by encouraging the widespread use of electronic data interchange in the U.S. health care system.*

HIPAA - Protected Health Information (PHI)	*Protected health information (PHI) under HIPAA, is any information about an individual's health status that identifies or relates to an individual's past, present or future physical or mental health, the provision of health care to the individual, or the past, present or future payment for health care. Information is deemed to identify an individual if it includes either the individual's name or any other information that could enable someone to determine the individual's identity.* *Identifiers include:* • *Name* • *Address (all geographic subdivisions smaller than state, including street address, city, county, ZIP code)* • *All elements (except years) of dates related to an individual (including birth date, admission date, discharge date, date of death and exact age if over 89)* • *Telephone numbers FAX number* • *E-mail address Social Security number* • *Medical record number* • *Health plan beneficiary number* • *Account number Certificate/license number* • *Any vehicle or other device serial number* • *Device identifiers or serial numbers* • *Web URL Internet Protocol (IP) address numbers* • *Finger or voice prints Photographic images*
HIS	*Hospital Information System (HIS) is the main system in a hospital used by most caregivers. Sends ADT broadcasts to all ancillary applications. The HIS is typically the patient administrative system and order entry system for a hospital.*
HITSP	*Healthcare Information Technology Standards Panel (HITSP) serves as a cooperative partnership between the public and private sectors for the purpose of achieving a widely accepted and useful set of standards specifically to enable and support widespread interoperability among healthcare software applications, as they will interact in a local, regional and national health information network for the United States.*
HL7	*HL7 is a Standards Developing Organization accredited by the American National Standards Institute (ANSI) to author consensus-based standards representing a board view from healthcare system stakeholders. HL7 has compiled a collection of message formats and related clinical standards that define an ideal presentation of clinical information, and together the standards provide a framework in which data may be exchanged.*
HL7 Batch Protocol	*The HL7 Batch Protocol transmits a batch of HL7 messages using FHS, BHS, BTS, and FTS segments to delineate the batch.*
HL7 FHIR	*FHIR stands for Fast Healthcare Interoperable Resource. This emerging standard combines the best features of HL7 V2, HL7 V3, and CDA, while leveraging the latest web service technologies. The design of FHIR is based on RESTful web services. With RESTful web services, the basic HTTP operations are incorporated including Create, Read, Update and Delete. FHIR is based on modular components called "resources," and these resources can be combined together to solve clinical and administrative problems in a practical way. The resources can be extended and adapted to provide a more manageable solution to the healthcare demand for optionality and customization. Systems can easily read the extensions using the same framework as other resources.*

HTTP	*HTTP (Hypertext Transfer Protocol) is the foundation for application-level communication on the internet.*
HTTPS	*HTTPS (Hypertext Transfer Protocol Secure) is the product of layering HTTP on top of the SSL/TLSencryption protocol with the goal of preventing "man in the middle" eavesdropping during network transport.*
ICD-9	*ICD-9 is a classification used in the medical field that stands for **International Classification of Diseases, 9th revision**. This classification is predominately the standard classification of diseases, injuries, and cause of death for the purpose of health records. The World Health Organization (WHO) assigns, publishes, and uses the ICD to classify diseases and to track mortality rates based on death certificates and other vital health records. Medical conditions and diseases are translated into a single format with the use of ICD codes.*
ID	*ID is a coded value data type. The value of such a field follows the formatting rules for a ST field except that it is drawn from a table of legal values. Examples of ID fields include religion and sex.*
IEEE	*Institute of Electrical and Electronics Engineers (IEEE) is accredited by ANSI to submit its documents for approval as American National Standards. IEEE subcommittee P1073 develops standards for healthcare informatics: MEDIX (P1157) and MIB (P1073).*
IHE	*Integrating the Healthcare Enterprise (IHE) is an initiative by healthcare professionals and industry to improve the way computer systems in healthcare share information.*
Interface Engine	*An **interface engine** can transform or map the data to the receiving application's requirements while the message is in transit so that it can be accepted by the receiving application. The application interface is built with one-to-many concepts in mind. These import/export modules then are connected to an interface engine so that the mapping, routing, and monitoring are managed by this system.*
Interoperability	*Interoperability refers to the ability of two or more systems or components to exchange information and to use the information that has been exchanged.*
LIS	*Laboratory Information System (LIS) is an information system that receives, processes, and stores information generated by a medical laboratory process. LIS is often interfaced with HIS and EMR applications.*
LOINC	*Logical Observation Identifiers Names and Codes (LOINC) applies universal code names and identifiers to medical terminology related to the EHR and assists in the electronic exchange and gathering of clinical results (such as laboratory tests, clinical observations, outcomes management and research).*
Meaningful Use	*Meaningful Use is a term associated with The American Recovery and Reinvestment Act of 2009 (ARRA) that authorizes the Centers for Medicare & Medicaid Services (CMS) to provide reimbursement incentives for medical professionals and hospitals that become compliant in the use of certified electronic health record (EHR) technology. Professionals and hospitals that meet the criteria of "meaningful use" will begin receiving incentive payments in 2011 with a gradual decline in reimbursement amounts until the year 2015. By this date, providers are expected to have adopted and be actively utilizing a certified EHR in compliance with the "meaningful use" definition or be subject to financial penalties under Medicare.*
NAT	*NAT (Network Address Translation) is the process of modifying IP addresses by a traffic routing device. The typical use of NAT is to allow multiple users on a private network to use a single IP address to access the internet.*

NCPDP	*The National Council for Prescription Drug Programs (NCPDP) creates and promotes the transfer of data related to medications, supplies, and services within the healthcare system through the development of standards and industry guidance.*
NHIN	*Nationwide Health Information Network (NHIN) is one of the ONC's major initiatives. As defined by the ONC, NHIN is: "a set of standards, services and policies that enable secure health information exchange over the Internet. The NHIN will provide a foundation for the exchange of health IT across diverse entities, within communities and across the country, helping to achieve the goals of the HITECH Act."*
NIST	*National Institute of Standards and Technology - Founded in 1901, NIST is a non-regulatory federal agency within the U.S. Department of Commerce. NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. NIST have made solid contributions to image processing.*
ONC	*Office of the National Coordinator for Health Information Technology (ONC) - Located within the Office of the Secretary for the U.S. Department of Health and Human Services (HHS), the Office of the National Coordinator (ONC) coordinates nationwide efforts to support the adoption of health information technology and the promotion of health information exchange to improve health care. The ONC position was established in 2004 with an Executive Order and legislatively mandated in the Health Information Technology for Economic and Clinical Health Act (HITECH Act) of 2009.*
ONC-ATCB	*ONC-Authorized Testing and Certification Bodies - Following the Meaningful Use stage one final rule in July of 2010, the Office of the National Coordinator selected six organizations to assume responsibility for the certification of complete EHR and EHR modules. These ONC-ATCB are required to certify based upon the certification requirements outlined in the Standards and Certification Criteria Final Rule. According to the ONC, "Certification by an ATCB will signify to eligible professionals, hospitals, and critical access hospitals that an EHR technology has the capabilities necessary to support their efforts to meet the goals and objectives of Meaningful Use."*
PACS	*Picture Archiving Communication Systems (PACS) are devoted to the storage, retrieval, distribution, and presentation of images. The medical images are stored in an independent format, most commonly DICOM.*
PAT	*PAT (Port Address Translation) is a type of network address translation in which each device on a LAN is translated to the same IP address, but with a different port number assignment.*
Payload	*Payload refers to the content of the message being sent (i.e., the message body).*
PDQ	*Patient Demographics Query (PDQ) - What it's used for: Requesting patient ID's from a central patient information server based on patient demographic information. It is used when a system has only demographic data for patient identification.* *Example: Hospital A admits Patient Y, who has not been at the hospital before. Hospital A submits a request to the local HIE, based on demographic information such as name, birth date, sex, etc., to obtain the appropriate HIE patient ID for Patient Y.*

PHR Dossier électronique du patient (DEP)	*Personal Health Record (PHR), as defined in Defining Key Health Information Technology Terms (The National Alliance for Health Information Technology, April 28, 2008): An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared, and controlled by the individual.* Le dossier électronique du patient (DEP) est un dossier virtuel permettant de consulter en ligne des données enregistrées de manière décentralisée qui sont pertinentes pour le traitement d'un patient. Le DEP est géré par les professionnels de la santé, en accord avec les patients. Les contenus sont accessibles tout au long du traitement, indépendamment du lieu et du temps. En Suisse, les patients ont le droit de le consulter et de gérer les droits d'accès.
PIX	*Patient Identifier Cross Referencing (PIX) What it is used for: Cross-referencing multiple local patient ID's between hospitals, sites, health information exchange networks, etc. Used when local patient ID's have been registered with a PIX manager.* *Example: Hospital A transmits Patient D's ID information to the HIE for cross referencing. Hospital A receives Patient D's local ID for Hospital B which they can use to request information from Hospital B, based on need.*
PMS	*Practice Management System (PMS) applications facilitate the day-to-day operations of a medical practice. PMS software enables users to capture patient demographics, schedule appointments, maintain lists of insurance payers, perform billing tasks, and generate reports. It handles the administrative and financial matters for a practice.*
Point-To-Point Interface	*A point-to-point interface is one in which the receiving vendor provides a specification on what data it can receive and in what format it needs to be in. The sending application then builds an interface to that specification for that application. It is a one-to-one relationship. For each application requiring an interface, there is a new request and point-to- point interface developed.*
Public IP Address	*The Public IP Address (vs. Private or LAN Address) The public IP address is the outward-facing IP address that is presented to the internet by the router hardware. A private IP address is an internal IP address that is discernible only by devices on the same local network. (See NAT and PAT.)*
RadLex	*RadLex is a controlled terminology for radiology. The purpose of RadLex is to provide a uniform structure for capturing, indexing, and retrieving a variety of radiology information sources. This may facilitate a first step toward structured reporting of radiology reports. The RadLex project - to develop a comprehensive radiology lexicon - is sponsored by the Radiological Society of North America (RSNA), along with the collaboration of the American College of Radiology (ACR) and other subspecialty societies. .*
REST	*REST (Representational State Transfer) is a web services approach used heavily in social media sites. Uses HTTP in conjunction with GET, POST, PUT, and DELETE.*

RHIO	*Regional Health Information Organization (RHIO) - The terms "RHIO" and "Health Information Exchange" or "HIE" are often used interchangeably. A RHIO is a group of organizations with a business stake in improving the quality, safety and efficiency of healthcare delivery. RHIOs are the building blocks of the proposed National Health Information Network (NHIN) initiative proposed by David Brailer, MD, and his team at the Office of the National Coordinator for Health Information Technology (ONCHIT). To build a national network of interoperable health records, the effort must first develop at the local and state levels. The concept of NHIN requires extensive collaboration by a diverse set of stakeholders. The challenges are many to achieve success for a health information exchange or a RHIO.*
RIS	*Radiology Information System (RIS) is the main application in an imaging center or radiology department. RIS is used by to store, manipulate and distribute patient radiological data and imagery. RIS are used for patient scheduling, tracking, and image tracking.*
SLI Global Solutions	*SLI Global Solutions serves one of the ONC-ATCB for electronic health record (EHR) certification. SLI Global Solutions was certified by the ONC on December 10, 2010 and is authorized to certify complete EHR and EHR modules.*
SMPT	*SMTP represents Simple Mail Transfer Protocol. SMTP is widely utilized for e-mail transmissions across Internet Protocol (IP) networks.* *The SMTP protocol started out purely ASCII text-based, it did not deal well with binary files or characters in many non-English languages. Because of this, standards such as Multipurpose Internet Mail Extensions (MIME) were developed to encode binary files for transfer through SMTP.* *In healthcare, the MIME standard CCD documents can be treated as a MIME package in an SMTP e-mail. To make the SMTP e-mail secure, a secure version of MIME, called S/MIME, can be utilized. S/MIME along with certificates can be combined with SMTP to keep patient health information safe. The Direct Project provides the specifications for accomplishing this.*
SOAP	*SOAP (Simple Object Access Protocol) is a web services protocol used heavily in healthcare to implement IHE profiles. SOAP is an enterprise standard that is typically used by business applications to exchange information across the enterprise.*
SOAP Envelope	*SOAP Envelope refers to the outermost wrapper of a SOAP message, containing addressing and security information.*
SSL	*SSL (Secure Sockets Layer) is a cryptologic protocol for securing communications over a network. The successor to SSL is TLS.*
TCP/IP	*Transmission Control Protocol/Internet Protocol (TCP/IP) is a low-level communications protocol used to connect hosts on the Internet or a network. TCP/IP connections are established between clients and servers via sockets. TCP/IP is stream-oriented meaning it deposits bits in one end and they show up at the other end.*
TCP/IP Basics:	*Socket is "communication endpoint"* *Server = wait for connection* *Client = initiate connection* *Sequenced, reliable transport* *Bi-directional by definition* *Sometimes/often used uni-directionally*
TLS	*TLS (Transport Layer Security) is a successor to SSL and offers increased security.*

VEA	*Vendor Enterprise Archive (VEA) - PACS vendors archive solution that stores multi-department images. As in the past, software upgrades and new PACS or storage system changes with a VEA can result in data migration of entire image repository.*
VNA	*Vendor Neutral Archive (VNA) - A software solution that acts as a middleware application between one or many clinical workflow applications, formerly known as PACS, and various storage platforms and IT strategies. VNA will support: one or many clinical viewing applications, a standards-based environment, storage virtualization strategies, robust business continuity deployments and virtual environments.*
Web Services	*Web services are a standardized way of integrating applications. Using open standards, businesses can communicate without in-depth knowledge of one another's systems, beyond the communication protocol. Because all communication is XML-based, web services are not restricted to a specific operating system or programming language and do not require the use of browsers or HTML.*
WSDL	*A WSDL is an XML-based document for locating and describing a web service. WSDLs contain the identifying information and configuration data for a web service. An application developer will produce a WSDL to make it easier to configure the user's application to communicate with their web service.*
X12	*X12 provides for electronic exchange of business transactions-electronic data interchange (EDI). The American National Standards Institute (ANSI) chartered the Accredited Standards Committee (ASC) X12 to develop uniform standards.*
XDM	*Cross-enterprise Document Media Interchange (XDM) - What it is used for: According to IHE, XDM transfers documents and metadata using CDs, USB memory or email attachments. This profile supports environments with minimal capabilities in terms of using Web Services and generating detailed metadata. This standard is utilized by the Direct Project.* *Example: Using secure e-mail, a physician e-mails the patient's CCD to the patient's Microsoft Healthvault e-mail account for uploading to the patient's online PHR.*
XDR	*Cross-enterprise Document Reliable Interchange (XDR) - What it's used for: The exchange of health documents between health enterprises using a web-based, point-to-point push network communication, permitting direct interchange between EHRs, PHRs and other systems without the need for a document repository.* *Example: A nurse at Hospital A enters a patient's information in the local EHR, and then sends the CCD directly to Hospital B's system.*
XDS-I.b	*Cross-enterprise Document Sharing for Imaging - What it's used for: The sharing of images, diagnostic reports and related information through a common registry.* *Example: A radiologist accesses the local HIE, in a similar manner as for XDS.b, to find a MR report conducted and uploaded to the HIE at Hospital A.*

XDS.b	*Cross-enterprise Document Sharing What it's used for: The sharing of documents between any health care enterprise, ranging from a private physician office to a clinic to an acute care in-patient facility, through a common registry. Medical documents can be stored, registered, found and accessed.*
DSP	Le Dossier de Soins Partagé, ou DSP, est un dossier électronique regroupant les informations de santé du patient, sous son contrôle direct ou par l'intermédiaire d'un professionnel de santé de confiance (par exemple son médecin référent) En Europe, d'habitude, un DSP sera créé automatiquement pour toute personne ayant un numéro CNS. Pour les autres, l'ouverture se fait au cours d'une hospitalisation ou d'une consultation.
e-santé	L'e-santé représente l'utilisation de l'informatique pour que les soins au patient se déroulent de la manière la plus efficiente et la plus efficace possible. Pour pouvoir offrir aux patients les meilleurs soins possibles, les patients eux-mêmes et leurs prestataires doivent avoir accès le plus rapidement possible à une information correcte. L'e-santé peut y contribuer. Grâce à internet, aux appareils mobiles, aux applis… les patients peuvent devenir les copilotes de leur propre santé. Et les prestataires de soins tirent également profit de ces applications digitales: ils disposent toujours d'un dossier à jour de leurs patients, ils peuvent mieux communiquer avec leurs collègues et ils ont de nouvelles possibilités pour suivre leurs patients à distance." L'e-santé n'est pas une fin en soi, mais un moyen de maintenir et, lorsque c'est possible, d'améliorer la qualité, l'accessibilité et la pérennité des soins de santé. Il est impossible d'associer une définition statique à la notion d'« e-santé ». L'e-santé se définit par son utilisation. Il s'agit donc d'un concept dynamique, qui évolue. Dans la revue scientifique « Journal of Medical Internet Research »(1), le professeur allemand Gunther Eysenbach tente de le décrire de manière adéquate : « L'e-Santé est un domaine émergent à l'intersection de l'informatique médicale, de la santé publique et du monde des entreprises. Elle fait référence à des services et informations en matière de santé qui sont fournis ou améliorés grâce à internet et aux technologies apparentées. Au sens large, le terme renvoie non seulement à l'évolution technologique, mais aussi à une mentalité, un mode de pensée, une attitude et un engagement à la réflexion globale en réseau, afin d'améliorer les soins de santé aux niveaux local, régional et mondial en utilisant les technologies de l'information et de la communication. (1)J Med Internet Res 2001; 3(2):e20. doi:10.2196/jmir.3.2.
PHR	Le Personal health record (PHR) donne aux patients un accès à leur dossier médical, à condition qu'il soit disponible électroniquement. Ils peuvent eux-mêmes ajouter des informations au PHR et demander conseil ou demander des informations supplémentaires et s'acquitter de tâches administratives dans le PHR.
m-health	Mobile health ou m-health désigne l'utilisation des appareils mobiles et des applications afin de promouvoir et/ou de suivre la santé.

Interopérabilité	L'interopérabilité est la capacité que possèdent des organisations (et leurs processus et systèmes) de partager des informations avec efficience et efficacité entre elles ou avec leur environnement. Elle nécessite des accords clairs, notamment sur les règles d'échange de données, l'architecture générale des systèmes d'échange, les messages échangés, la structure des documents médicaux et le codage de l'information. Des normes, des protocoles et des procédures sont nécessaires pour bien coordonner les différentes entités
DPP	Le dossier pharmaceutique partagé (DPP) permet aux pharmaciens de consulter dans leur pharmacie l'historique de médicaments du patient après avoir obtenu son autorisation. Cet outil doit favoriser la continuité des soins : les pharmaciens peuvent suivre plus facilement les médicaments délivrés, détecter les contre-indications…
DMI	Le dossier médical informatisé (DMI) permet au médecin généraliste d'enregistrer les données d'un patient de manière électronique et structurée. Ce dossier comprend des données sur le patient qui proviennent de différentes sources: du patient lui-même (p.ex. données socio-administratives, description personnelle de données concernant la maladie ou la santé); du médecin traitant sur des actes professionnels (p.ex. anamnèse, diagnostic, hypothèses de décision, résultats d'examens, traitements), sur le processus de réflexion (p.ex. hypothèses, diagnostics différentiels); de tiers autres professionnels de la santé qui traitent le patient, mais qui n'ont pas de dossier électronique non-prestataires de soins (p.ex. informations communiquées par des membres de la famille, amis ou connaissances du patient).

Appendix 2: Lebanon eHealth country profile (WHO Survey - [30])

Lebanon

Country context*				
Population (000s)	4,822	Life expectancy at birth (years)	80
GNI per capita (PPP Int $)	17,390	Total health expenditure (% GDP)	7.2
Physician density (per 10 000 population)	3.20	ICT Development Index rank	52
Nurse & midwife density (per 10 000 population)	2.72	Mobile-cellular subscriptions (% population)	80.81
Hospital bed density (per 10 000 population)	35	Internet users (% population)	61.2

1. eHealth foundations

National policies or strategies			
	Country response	Global "yes" response‡	Year adopted
National universal health coverage policy or strategy	Yes	75%	2012
National eHealth policy or strategy	No	58%	N/A
National health information system (HIS) policy or strategy	No	66%	N/A
National telehealth policy or strategy	No	22%	N/A
Funding sources for eHealth			
	Country response	Global "yes" response‡	Funding source %**
Public funding	No	77%	Zero
Private or commercial funding	No	40%	Zero
Donor/non-public funding	Yes	63%	25-50%
Public-private partnerships	Yes	42%	‡
Multilingualism in eHealth			
	Country response	Global "yes" response‡	Year adopted
Policy or strategy on multilingualism	No	28%	N/A
Government-supported Internet sites in multiple languages	Yes	48%	
eHealth capacity building			
	Country response	Global "yes" response‡	Proportion**
Health sciences students – Pre-service training in eHealth	Yes	74%	<25%
Health professionals – In-service training in eHealth	Yes	77%	25-50%

2. Legal frameworks for eHealth

Policy or legislation – purpose	Country response	Global "yes" response‡
Defines **medical jurisdiction, liability or reimbursement of eHealth services** such as telehealth	No	31%
Addresses **patient safety and quality of care** based on data quality, data transmission standards or clinical competency criteria	No	46%
Protects the **privacy of personally identifiable data** of individuals irrespective of whether it is in **paper or digital format**	Yes	78%
Protects the **privacy of individuals' health-related data** held in electronic format in an **EHR**	No	54%
Governs the **sharing of digital data between health professionals in other health services** in the same country through the use of an EHR	No	34%
Governs the **sharing of digital data between health professionals in health services** in other countries through the use of an **EHR**	No	22%
Governs the **sharing of personal and health data between research entities**	No	39%
Allows **individuals electronic access to their own health-related data** when held in an **EHR**	No	29%
Allows **individuals to demand their own health-related data be corrected** when held in an **EHR** if it is known to be inaccurate	No	32%
Allows **individuals to demand the deletion of health-related data** from their **EHR**	No	18%
Allows **individuals to specify which health-related data** from their **EHR** can be **shared with health professionals** of their choice	No	28%
Governs **civil registration and vital statistics**	Yes	76%
Governs **national identification management systems**	Yes	65%

World Health Organization

3. Telehealth

Telehealth programmes country overview		
	Health system level**	Programme type**
Teleradiology	Intermediate	Informal
Teledermatology	Intermediate	Informal
Telepathology	‡	‡
Telepsychiatry	‡	‡
Remote patient monitoring	‡	‡

4. Electronic Health Records (EHRs)

EHR country overview		
	Country response	Year introduced
National EHR system	No	N/A
Legislation governing the use of the national EHR system	‡	
Health facilities with EHR	**Use EHR**	**Facilities with EHR %****
Primary care facilities (e.g. clinics and health care centres)	N/A	‡
Secondary care facilities (e.g. hospitals, emergency care)	N/A	‡
Tertiary care facilities (e.g. specialized care, referral from primary/secondary care)	N/A	‡
Other electronic systems	**Country response**	**Global "yes" response§**
Laboratory information systems	N/A	35%
Pathology information systems	N/A	18%
Pharmacy information systems	N/A	33%
PACS	N/A	26%
Automatic vaccination alerting system	N/A	10%
ICT-assisted functions	**Country response**	**Global "yes" response§**
Electronic medical billing systems	Yes	58%
Supply chain management information systems	Yes	58%
Human resources for health information systems	Yes	69%

5. Use of eLearning in health sciences

eLearning programmes country overview		
Health sciences students – Pre-service	**Country response**	**Global "yes" response§**
Medicine	Yes	58%
Dentistry	No	39%
Public health	Yes	50%
Nursing & midwifery	Yes	47%
Pharmacy	Yes	38%
Biomedical/Life sciences	Yes	42%
Health professionals – In-service	**Country response**	**Global "yes" response§**
Medicine	Yes	58%
Dentistry	No	30%
Public health	Yes	47%
Nursing & midwifery	Yes	46%
Pharmacy	Yes	31%
Biomedical/Life sciences	Yes	34%

6. mHealth

mHealth programmes country overview		
Accessing/providing health services	**Health system level****	**Programme type****
Toll-free emergency	‡	‡
Health call centres	National	Established
Appointment reminders	National, Intermediate	Established
Mobile telehealth	‡	‡
Management of disasters and emergencies	‡	‡
Treatment adherence	‡	‡
Accessing/providing health information	**Health system level****	**Programme type****
Community mobilization	National	Established
Access to information, databases and tools	‡	‡
Patient records	Intermediate	Informal
mLearning	‡	‡
Decision support systems	‡	‡
Collecting health information	**Health system level****	**Programme type****
Patient monitoring	‡	‡
Health surveys	National	Established
Disease surveillance	National	Established

7. Social media

Social media and health	Country response	Global "yes" response§	Year adopted
National policy or strategy on the use of social media by government organizations	No	18%	N/A
Policy or strategy makes specific reference to its use in the health domain	‡	5%	
Health care organizations – use of social media		**Country response**	**Global "yes" response§**
Promote health messages as a part of health promotion campaigns		Yes	78%
Help manage patient appointments		Yes	24%
Seek feedback on services		Yes	56%
Make general health announcements		Yes	72%
Make emergency announcements		No	59%
Individuals and communities – use of social media		**Country response**	**Global "yes" response§**
Learn about health issues		Yes	79%
Help decide what health services to use		Yes	56%
Provide feedback to health facilities or health professionals		Yes	62%
Run community-based health campaigns		Yes	62%
Participate in community-based health forums		Yes	59%

8. Big data

Policy or strategy – purpose	Country response	Global "yes" response§	Year adopted
Governing the use of big data in the health sector	No	17%	N/A
Governing the use of big data by private companies	No	8%	N/A

LEGEND

* Country context indicators
ICT Development Index Rank, 2015 - https://www.itu.int/net4/ITU-D/idi/2015/
All other country indicators, Global Health Observatory, 2012-2014 - http://www.who.int/gho

** Glossary
§ Indicates the percentage of participating Member States responding "Yes"
— Don't know
N/A Not applicable
‡ Indicates question was unanswered
☐ Question not asked
Zero No funding

International level: Health entities in different geographic regions
Regional level: Health entities in countries in the same geographic region
National level: Referral hospitals, laboratories and health institutes (mainly public, but also private)
Intermediate level: District or provincial facilities: public and private hospitals and health centres
Local or peripheral level: Health posts, health centres providing basic level of care
Informal: Use of ICT for health purposes in the absence of formal processes and policies
Pilot: Testing and evaluating a programme
Established: An ongoing programme that has been conducted for a minimum of 2 years and is planned to continue

Appendix 3: A checklist in preparing for hospital-wide electronic medical record implementation and digital transformation [18]

1) **EMR implementation**	
a) Organizational considerations	1. Do you have strong leadership? 2. Do you have an appropriate governance structure? 3. Have you identified and recruited clinical champions? 4. Do you have an implementation plan?
b) Technical considerations	5. Do you have a reliable and responsive vendor with a mature system that is fit (or near fit) for purpose? 6. Do you have a highly capable and responsive information technology and project management teams? 7. Is the system aligned with clinician need and work flows? 8. Is the hardware aligned with clinician needs and work flows? 9. Is the new digital system capable of integrating with existing legacy systems and applications?
c) Training considerations	10. Have you developed an appropriate user training and support program? 11. Have you developed and tested contingency plans for expected and unexpected problems at go-live? 12. How will you decide between instantaneous hospital-wide go-live and a staggered roll-out? 13. Have you a plan for providing support to staff at the point of care?
2) Digital transformation	
a) Cultural considerations	14. Do you have a clear and clinically focused vision statement and communication strategy? 15. Have you undertaken a readiness for change survey of the organization?
b) Managing digital disruption	16. Do you have a plan to deal with potential adverse effects of digital disruption?
c) Innovation and improvement of patient care	17. Have you a plan after go-live for managing optimization? 18. Do you have a strategy for evaluating quality and benefits of digital transformation? 19. Do you have a plan for ongoing digital transformation and innovation to improve care?

Appendix 4: Focus Group Discussion Results

Dimension 1: Governmental Regulations and Roles

Challenges & barriers	Success Factors	Recommendations
• **Lack of government/legal mandate:** Lack of ministerial decision; lack of legislation supporting EHR; lack of national policy and plan; EHR is not and accreditation requirement for hospitals; E-government is not applied in Lebanon; lack of public priorities and strategies. • **Fragmented health system**: Different codes and tariffs used; no unified standards; no unique drug codes; no consensus on unique patient identifier at the national level; fragmentation of health information; no common standards; different coding systems. • **Missing leadership**: No single authoritative decision; missing leading entity for the EHR project in Lebanon; no initiative and vision at the national level; no unified vision amongst the stakeholders regarding EHR. • **Lack of coordination:** Lack of private-public partnership; lack of collaboration and centralization of authority; lack of coordination at the national level; lack of internal and external coordination (between hospitals and within each hospital); lack of proper collaboration between the different healthcare professionals; unwillingness to share data; competition between the healthcare institutions; lack of trust between entities in Lebanon; lack of buy in of some hospitals; lack of transparency. • **Lack of continuity**: issues related to sustainability and ownership; lack of commitment; change of priorities and public strategies; lack of continuity from one minister to another. • **No budget for EHR:** Lack of funds and resources to do the project from A to Z; lack of funds dedicated for EHR; no investment in EHR.	• **Good planning:** radical start; mandate a national health records strategy; building a road map; strategic decision; engaging stakeholders; incentives for hospitals; realistic progress; gradual phasing. • **Cooperation** between the different stakeholders: cooperation; coordination; legislation; good planning. • **Commitment:** Strategic decision and governmental commitment; commitment of hospitals; political commitment; implementing decrees (مراسيم تطبيقية); commitment to implementation. • **Support:** Local support; investment of private providers; government support; teamwork; continuity of care; continuous follow up. • **Leadership and ownership:** Appropriate integration at the national level; having the will; trust; transparency; strong commitment and leadership.	• **Strategic and action planning:** having the same vision, including the patient, start the earliest before the hospitals start installing EHR, having a clear strategy, political commitment, starting on a small scale, benefiting from other experiences, having a mini collaboration project as proofs of concept before embarking on high profile efforts that could be resisted, imposing a model on the public hospitals and then generalize it for the rest, monitoring outcomes, sustainability of the project, comprehensive assessment, having real set of deliverables, action plan with a time frame, detailed corrective action plan, planning with short term achievable milestones, reaching a common ground to proceed • **Regulations and legislations:** making it obligatory to commit, having a certifying body, National decision, creating a national committee, private-public council, creating a coordination body and issue recommendations, setting national standards for coding, enforcing the new system, unification of standards, overcoming the issue of privacy and confidentiality, binding legislations. • **Accreditation:** having EHR as a criterion for accreditation, using EHR as a requirement for accreditation, adopting HIMSS accreditation: paper less hospital. • **Providing incentives:** Creating incentives to the hospitals to adopt the EHR system, providing incentives for all stakeholders, improving the health tourism as an incentive. • **Providing financial and non-financial support:** continuity in training, involvement of all stakeholders, political will to change, financial support, securing funding, budgeting and monitoring, having a budget for implementation, guiding the suppliers of health software and collaborating with them.

Dimension 2: User Access and Accessibility Policies and Infrastructure

Challenges & barriers	Success Factors	Recommendations
• **Confidentiality issues:** Data accessibility; fear of security at the patient's level; security of data especially for the military; issue of data security; confidentiality and privacy. • •**Lack of awareness about the benefits of EHR**: Lack of culture and lack of awareness concerning the need for EHR at the national level	• **Empowered patients:** patients' acceptance, knowledge, and mentality; changing the culture.	• **Raising awareness about EHR benefits:** Advocacy groups; engaging the media; continuous awareness campaigns; mobilization on the benefits of EHR; advocacy

Dimension 3: Standardization, Policies, Protocols and Procedures

Challenges & barriers	Success Factors	Recommendations
• **Lack of unified standards**: lack of standardization of dictionaries; lack of technology and terminology standards; lack of semantic coding standards; lack of unified coding system; diversity of codes; different standards and school of medicine; lack of unique patient ID; lack of interoperability standards; lack of data storage standards; building a common ground; having a common language; classification of diseases; increase the structured medical information; good quality of codes	• **Standards**: Standardization of the messaging and terminologies used in the different systems; a standard continuous training for the users.	• **Standardization: to have one language between the stakeholders;** to standardize documentation between all the stakeholders; standardizing medical and paramedical care; standardization of documentation process.

Dimension 4: Information Communication Technologies Architecture/Infrastructure

Challenges & barriers	Success Factors	Recommendations
• **Weak infrastructure at the level of institutions:** Non-readiness of the organizational structure; lack of organizational maturity; maintenance; lack of technological means. • **Weak infrastructure at the national level**: weak internet connection, absence of data centralization; no Lebanese EHR software; electricity in the country. • **Data transfer issues**: transfer of medical history; data migration issue; data quality; data storage; data standardization; time consuming transition; trust issues in the quality of data received from other organizations. • **Database:** data transfer and migration; data storage; interoperability; data transfer from the paper based to the electronic phase; information quality; old data entry; privacy and security compliance. • **IT Human resources knowledge and skills:** Lack of educational programs for HIS in the curriculum of health professionals; lack of trainings; lack of expertise; lack of know-how readiness; lack of technology specialists; lack of IT qualified people, no skilled individuals to use this system; need for data entry personnel, need for specialized personnel; lack of capacity building; lack of awareness of benefits; lack of awareness of return on investment. • **Lack of financial resources for infrastructure**: Lack of resources required for absolute integration and interoperability; lack of resources for continuous training; lack of financial and technical resources; variability in the financial situation of hospitals (not all the hospitals in Lebanon are capable financially to have an EMR). • **High cost of infrastructure**: Huge initial investment; high maintenance cost; high electricity cost; high hardware cost; high software cost.	• **Implement Solutions that support interoperability:** compatible software with laws; security; availability of Billing system; special programs for Doctors; reliability. • **IT Human resources expertise:** multidisciplinary project teams; appropriate know-how and expertise, skilled people; experienced employees and physicians; well prepared workforce; availability of proper human resources. • IT Human resources knowledge and education: having university degrees for such people; knowledge about both IT and Health; skills. • Having a comprehensive budget for EHR: feasible system	• **Proper education and training of all stakeholders**: intensive training plan to include all physicians and staff; training for data entry personnel

Appendix 5: Hospital Readiness Survey Results

Survey title: Hospital Readiness Survey: A Road Map for eHealth in Lebanon

Part I - General Information

What would better describe your role/affiliation?	N	Percentage
Hospital staff (Physicians, Nursing, Administration...)	14	19.7%
Information Technology staff (IT staff, IT Leadership...)	31	43.7%
Private Payers (Insurance, Social organizations...)	26	36.6%
Total	71	100%
Number of Beds	**N**	**Percentage**
0-100	4	28%
101-200	5	36%
201-300	3	21%
301-400	2	14%
Total	14	100%
Number of physicians with admitting privileges	**N**	**Percentage**
0-50	4	29%
51-100	2	14%
101-150	4	28%
151-200	1	7%
201-250	2	14%
301-350	1	7%
Total	14	100%
Number of nurses	**N**	**Percentage**
0-50	2	14%
100-150	3	21%
250-300	5	36%
350-400	1	7%
550-600	1	7%
650-700	1	7%
750-800	1	7%
Total	14	100%
Number of Emergency room visits per month	**N**	**Percentage**
0-500	3	21%
1000-1500	2	14%
3000-3500	2	14%
9000-9500	1	7%
Total	8	100%
Number of operations per month	**N**	**Percentage**
0-100	3	21%
201-300	2	14%
401-500	4	29%
501-600	1	7%
701-800	1	7%
1001-1100	1	7%
Total	12	100%

Number of desktop computers	N	Percentage
0-50	4	36%
101-150	2	18%
201-250	1	9%
300-350	3	27%
701-750	1	9%
Total	11	100%
Number of computer servers	**N**	**Percentage**
0-10	3	33%
11-20	2	22%
21-30	2	22%
31-40	2	22%
Total	9	100%

Part II - EHR Current Status

Have EHR	N	Percentage
Yes	19	32%
No	41	68%
Total	60	100%
System allows placing laboratory and radiology orders	**N**	**Percentage**
Yes	18	95%
No	1	5%
Total	19	100%
System accepts nurses' notes	**N**	**Percentage**
Yes	15	79%
No	3	16%
Uncertain	1	5%
Total	19	100%
System accepts doctors' notes	**N**	**Percentage**
Yes	17	90%
No	2	10%
Total	19	100%
System accepts pharmacy order	**N**	**Percentage**
Yes	17	90%
No	2	10%
Total	19	100%
System used in outpatient doctor clinics	**N**	**Percentage**
Yes	14	4%
No	4	21%
Uncertain	1	5%
Total	19	100%

System used for printing prescriptions	N	Percentage
Yes	11	58%
No	6	32%
Uncertain	2	10%
Total	19	100%
System Hl7 compatible	**N**	**Percentage**
Yes	13	68%
No	4	21%
Uncertain	2	11%
Total	19	100%
System has a patient portal	**N**	**Percentage**
Yes	**13**	**68%**
No	**4**	**21%**
Uncertain	**2**	**10%**
Total	**19**	**100%**
Certified system	**N**	**Percentage**
Yes	8	42%
No	3	16%
Uncertain	8	42%
Total	19	100%

Part III - Organizational Alignment

Does your organization have any plans to implement an EHR or other eHealth projects?		N	Percentage
Yes		14	35%
No		26	65%
Total		40	100%
Does the senior management view EHR as key to meeting future organizational goals?		**N**	**Percentage**
Yes		51	90%
No		6	10%
Total		57	100%
In what ways do you think an EHR improves clinical and administrative work?	**Yes** N (%)	**No** N (%)	**Total**
Fewer errors	62 (87%)	9 (13%)	71
Help in medical decisions	59 (83%)	12 (17%)	71
Improved legibility	64 (90%)	7 (10%)	71
Improved accuracy of documentation	66 (93%)	5 (7%)	71
No more lost charts	56 (79%)	15 (21%)	71
Lower patient mortality	32 (45%)	39 (55%)	71
Decreased overhead per admission	49 (69%)	22 (31%)	71
In what ways do you think an EHR would improve patient service?	**Yes** N (%)	**No** N (%)	**Total**
Faster view of results	66 (93%)	5 (7%)	71
Active participation in care	37 (52%)	34 (48%)	71
Patient can share his file with other providers	60 (85%)	11 (15%)	71

Do you agree or disagree that the below factors are obstacles to EHR implementation at the level of health care organizations?	Agree N (%)	Disagree N (%)	Not applicable N (%)	Total N
Staff lack of computer literacy and Typing skills	54 (76%)	15 (21%)	2 (3%)	71
Controlling privacy	40 (56%	30 (42%)	1 (1%)	71
Cost	54 (76%)	17 (24%)	0	71
Legal: Unified prescription requirements	43 (61%)	23 (32%)	5 (7%)	71
Legal: NSSF requirements	39 (55%)	23 (32%)	9 (13%)	71
Legal: saving hard copies	57 (8%)	10 (14%)	4 (7%)	71
Initial disruption in some financial, clinical and organizational processes while moving to a paperless system	55 (77%)	14 (20%)	2 (3%)	71
EHR may cause slower workflow and lower productivity	13 (18%)	58 (81.7%)	0	71
IT may interfere with physician-patient communication	27 (38%)	41 (58%)	3 (4%)	71
Consumer resistance	29 (41%)	38 (53%)	4 (6%)	71
Staff resistance	52 (73%)	18 (25%)	1 (1%)	71
Do you agree or disagree that the below factors are obstacles to exchanging medical information electronically in Lebanon?	**Agree**	**Disagree**	**Not Applicable**	**Total**
Absence of unique patient identifier	69 (97%)	2 (3%)	0	71
Absence of common billing codes	61 (89%)	6 (8%)	2 (3%)	71
Absence of common diagnosis codes	60 (85%)	11 (15%)	0	71
Absence of approved electronic signature	61 (86%)	9 (13%)	1 (1%)	71
Different languages in documentation	45 (63%)	24 (34%)	2 (3%)	71
Differing incompatible software used in hospitals	58 (82%)	12 (17%)	1 (1%)	71
Lack of legislation about patient privacy	61 (86%)	9 (13%)	1 (1%)	71
Weak internet infrastructure	59 (83%)	11 (16%)	1 (1%)	71
Negative attitude towards sharing databases	66 (93%)	5 (7%)	0	71
Cost of software maintenance	57 (80%)	13 (18%)	1 (1%)	71

Part IV - Human resources readiness

Do you have an Information Technology (IT) department at your organization?	N	Percentage
Yes	65	92%
No	6	8%
Total	71	100%
Number of fulltime IT staff	**N**	**Percentage**
1-10	36	55%
11-20	9	14%
21-30	4	6%
31-80	6	9%
100-150	7	11%
More than 150	3	5%
Total	65	100%
Estimate of the percentage of staff who use a computer in their daily work at your organization	**N**	**Percentage**
100%	16	23%
90%	15	21%
80%	15	21%
60%	8	11%
50%	5	7%
30%	5	7%
70%	3	4%
40%	2	3%
20%	1	1%
10%	1	1%
Total	71	100%
Estimate of the percentage of staff who use their e-mail in their daily work at your organization	**N**	**Percentage**
10%	13	18%
90%	12	17%
100%	11	16%
80%	7	10%
30%	6	9%
70%	5	7%
50%	5	7%
60%	4	6%
40%	4	6%
20%	4	6%
Total	71	100%

Estimate of the percentage of physicians who contribute more than 3 hours per week to support decisions about eHealth services at your organization	**N**	**Percentage**
0%	20	28%
10%	18	25%
50%	9	13%
70%	5	7%
90%	3	4%
60%	3	4%
40%	3	4%
30%	3	4%
20%	3	4%
100%	2	3%
80%	2	3%
Total	71	100%
Estimate of the percentage of nurses who are involved in more than 3 hours per week to support decisions about eHealth services at your organization	**N**	**Percentage**
0%	21	30%
10%	11	15%
30%	9	13%
20%	8	11%
50%	5	7%
60%	4	6%
90%	3	4%
100%	3	4%
80%	3	4%
40%	3	4%
70%	1	1%
Total	71	100
Do physicians at your organization understand the benefits of an EHR?	**N**	**Percentage**
Yes	44	62%
No	7	10%
Not applicable	20	28%
Total	71	100%
How do you rate the overall level of awareness and knowledge about eHealth at your organization?	**N**	**Percentage**
Very advanced	8	11%
Advanced	20	30%
Average	20	30%
Needs education & work	19	27%
Not at all	4	6%
Total	71	100%

How many senior IT managers do you have who are familiar with eHealth concepts and applications? Number of full-timers	N	Percentage
0	9	14%
1-5	37	57%
6-15	8	12%
20-40	7	11%
100 and above	4	6%
Total	65	100%
How many senior IT managers do you have who are familiar with eHealth concepts and applications? Number of consultants	**N**	**Percentage**
0	30	46.2%
1	14	21.5%
2-5	14	21.5%
10-20	4	6.1%
100 and above	3	4.5%
Total	65	100%
How many IT Support staff do you have who are familiar with eHealth concepts and applications? Number of full-timers	**N**	**Percentage**
0	12	17%
1-5	33	51%
6-15	10	15%
20-40	2	3%
50-80	4	6%
100 and above	4	6%
Total	65	100%

Part V - Operational Readiness

Do you have your clinical workflows and operations documented in policies and procedures documents?	N	Percentage
Yes	42	59%
No	10	14%
Not applicable	19	27%
Total	71%	100%
Did your organization identify ways in which EHR can improve current workflow and processes?	**N**	**Percentage**
Yes	41	58%
No	14	20%
Not applicable	16	22%
Total	71	100%

Do the financial and accounting departments have clearly documented processes that physicians and end users can adhere to?	N	Percentage
Yes	33	47%
No	15	21%
Not applicable	23	32%
Total	71	100%
Do you have a Clinical Informatics Committee to assist in initiating and executing eHealth initiatives?	**N**	**Percentage**
Yes	24	34%
No	24	34%
Not applicable	23	32%
Total	71	100%
Do you have an inventory of the number of devices and computers at your organization?	**N**	**Percentage**
Yes	61	86%
No	6	8%
Not applicable	4	6%
Total	71	100%
How many times a year do you offer computer training sessions to your staff?	**N**	**Percentage**
0	19	27%
>10	7	10%
1	19	27%
2	13	18%
3	3	4%
4	7	10%
5	2	3%
6	1	1%
Total	71	100

Part VI - Technology Readiness

Are the top-level executives prepared to upgrade hardware (if required) to ensure reliability of EHR system performance?	N	Percentage
Yes	47	66%
No	3	4%
Uncertain	21	30%
Total	71	100%
Do you have access to an Intranet (for internal communication) at your organization?	**N**	**Percentage**
Yes	64	90%
No	4	6%
Uncertain	3	4%
Total	71	100%

Do you have a data room?	N	Percentage
Yes	59	83%
No	6	8%
Uncertain	6	8%
Total	71	100%
Do you use an Online Payment System?	**N**	**Percentage**
Yes	44	62%
No	19	27%
Uncertain	8	11%
Total	71	100%
Do you have an Electronic Payroll System?	**N**	**Percentage**
Yes	53	74%
No	12	17%
Uncertain	6	8%
Total	71	100%
Do you have an Electronic Stock Management System?	**N**	**Percentage**
Yes	43	60%
No	14	20%
Uncertain	14	20%
Total	71	100%
Do you store ANY Patient Records Electronically?	**N**	**Percentage**
Yes	39	55%
No	23	32%
Uncertain	9	13%
Total	71	100%
Do you have an up-to-date database of your active doctors and nurses?	**N**	**Percentage**
Yes	44	62%
No	19	27%
Uncertain	8	11%
Total	71	100%
Do you have a Radiology Information System?	**N**	**Percentage**
Yes	31	44%
No	30	42%
Uncertain	10	14%
Total	71	100%
Do you have a Lab Information System?	**N**	**Percentage**
Yes	34	48%
No	25	35%
Uncertain	12	17%
Total	71	100%
Do you have an Electronic Pharmacy Management System?	**N**	**Percentage**
Yes	36	51%
No	25	35%
Uncertain	10	14%
Total	71	100%

Do you have an Electronic Nursing Scheduling System?	N	Percentage
Yes	26	37%
No	29	41%
Uncertain	16	22%
Total	71	100%
Do you have an Electronic Medication Dispensing System?	**N**	**Percentage**
Yes	26	37%
No	31	44%
Uncertain	14	20%
Total	71	100%
Do you use a Dictation System?	**N**	**Percentage**
Yes	17	24%
No	38	53%
Uncertain	16	22%
Total	71	100%
Do you use ICD codes?	**N**	**Percentage**
Yes	39	55%
No	24	34%
Uncertain	8	11%
Total	71	100%
Do you use CPT codes?	**N**	**Percentage**
Yes	27	38%
No	25	35%
Uncertain	19	27%
Total	71	100%

Part VII - eHealth Readiness

Do you use electronic internet billing with any insurance organization/company?	N	Percentage
Yes	25	35%
No	32	45%
Uncertain	14	20%
Total	71	100%
Does your organization have online communication methods/tools with patients?	**N**	**Percentage**
Yes	28	47%
No	32	53%
Total	60	100%

Appendix 6: Consensus Conference Presentations

Presentations also available at:
https://aub.edu.lb/fm/CME/Pages/EHR-Readiness.aspx
https://www.moph.gov.lb/en/Pages/6/18521/policy-support-observatory-pso-

Building Consensus on the Readiness for EHR in Lebanon
June 15, 2019

Policy
Support
Observatory

EHR Readiness Presentations –June 15, 2019

Roadmap for Lebanon
Dr. Ghassan Hamadeh

Building Consensus on the readiness for EHR in Lebanon
Mr. Joe-Max Wakim

Electronic Medical Record Adoption in Hospitals, the Lebanese Experience
Dr. Youssef Bassim

Building an E-health Roadmap: Key Learnings from France, Estonia and Monaco
Mr. Karim Hatem

Digitizing Healthcare in Jordan... How We Did It?
Mr. Ghassan Laham

Ministry of Public Health Interoperability Plan
Mr. Ali Romani

The Policy Support Observatory unit at the Ministry of Public Health (MoPH) is engaging all health care providers and stakeholders to **define a roadmap for eHealth in Lebanon through determining its essential pre-requisites and elements.**

Building Consensus on the Readiness for EHR in Lebanon

Focus Group Discussions → Surveying Stakeholders → General Meeting

Main outcome: a Request for Information (RFI) document for the "clinical patient care" part of an Electronic Health Record (EHR) to be used by MoPH.
The RFI will list: clinical standards; Interoperability standards, etc.

Focus Group Discussions

IT Focus Group April 24, 2019	• Participants from MOSA, GSF, ISF, SSF, NSSF, COOP, MoPH, BMC, AUB, ITB, CAS, MoD, OMSAR, RHUH, NBUH, WHO, HDF, MoT, ACT, and Akkar hospital
Payers' Focus Group April 24, 2019	• Participants from GSF, ISF, SSF, IMC, YMCA, UNICEF, GlobeMed, MoPH, LIBS, and COOP
Hospitals' Focus Group April 25, 2019	• Participants from Lebanese Order of Nurses, Hospitals syndicate and representatives from prominent hospitals
Public Sector Focus Group May 28, 2019	•Participants from professional orders and government authorities (ministries, army and government institutions)

Major themes discussed: benefits of implementing EHR; challenges; pre-requisites; timeline for implementation; channels and means; legislations.

Surveying Stakeholders

This survey explores the readiness, acceptance and needs of Lebanon Health Institutions to implement EHR and sharing medical information among them. It aims at setting recommendations on the content of an e-Health road map for Lebanon.

General Meeting

A general meeting for all stakeholders (Public and Private hospitals, Payers and IT) will be held on June 15, 2019 at AUBMC. Main topics:

- Jordan's experience in transitioning to EHR - *Mr. Ghassan Lahham (EHSI)*
- Europe's roadmap for eHealth - *Mr. Karim Hatem (YLIOS Consulting)*
- HIMSS survey in Lebanon - *Dr. Youssef Bassim (ITG)*
- Findings from Survey and Focus Group discussions - *Dr. Ghassan Hamadeh (AUBMC)*

e-Health Roadmap for Lebanon

Ghassan Hamadeh, MD

June 15, 2019

EHR READINESS

BUILDING CONSENSUS ON THE READINESS FOR EHR IN LEBANON

Dr. Ghassan Hamadeh

Email: ghamadeh@aub.edu.lb

Chief Medical Information Officer, Professor & Chair of Family Medicine at AUBMC and past president of the Arab Board & the Lebanese Society of Family Medicine. He is a consultant to WHO and advisor to the Ministry of Public Health in primary healthcare, pharmacoeconomics, and technology since 2004. He is leading the PSO initiative on "Building Consensus on the Readiness for EHR in Lebanon".

Policy Support Observatory
مرصد دعم السياسات الصحية

Support Health Sector Governance & Policy

I. Improved MOPH machinery & readiness	II. Improved service provision operations and financing	III. Intelligence & information	IV. Policy Dialogue

3. Expansion of UC schemes
4. Electronic health records
5. People-centred care
6. Scaling up accreditation
7. Overmedicalisation
8. Humanising palliative care

Discussions by communities of practice
لقاءات تشاورية حول

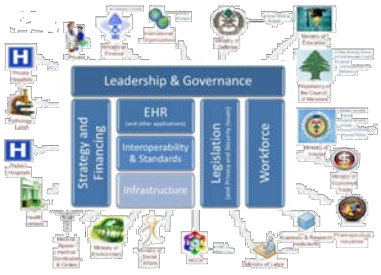
1. Readiness of Lebanon hospitals to adopt electronic health records
2. Expectations of Lebanon hospitals of an electronic health record
3. Document to be used by the ministry of public health to explore available vendors able to provide the perceived needed EHR

Electronic Health Record (EHR) = EMR that conforms to nationally recognized interoperability standards and can be available across more than one health care organization

Survey for hospital readiness and perspective on EHR

- EMR availability and HIMSS level
- Organizational support / alignment
- Human resource readiness
- Operational readiness
- Technology / infrastructure readiness
- Interoperability / eHealth readiness

Consensus building on eHealth Roadmap
توافق و ليس تنافس



EHR *goals*
اهداف الملف الصحي الالكتروني

- To provide any health care provider a spontaneous and secure access to a patient's medical record when necessary and with due respect to patient's privacy.
- To allow exchange of medical, service and financial information among health care providers, insurers and administrators with minimal technical limitations and due respect to patients privacy and information exchange security.
- To allow ministries and health institutions to collect medical information for planning and delivering services with due respect to patients privacy and information exchange security.

- إن يتمكن مقدم الخدمة الصحية من الاطلاع الآني على الملف الصحي لطالب الخدمة مع المحافظة على خصوصية المريض.
- إن يتمكن مقدمو الخدمات الصحية و الهيئات الضامنة من تبادل المعلومات الصحية و الخدماتية و المالية بأقل او دون عوائق تقنية مع المحافظة على خصوصية المريض و أمان الملفات و المعلومات المتبادلة.
- أن تتمكن الوزارات و الهيئات الصحية من جمع المعلومات الصحية لاستخدامها في التخطيط و تقديم الخدمات مع المحافظة على خصوصية المريض و أمان الملفات و المعلومات.

Important Findings

- HIMSS classification
- Certified Medical Record
- Interoperability Standards
- Infrastructure
- Human capacity
- Quality & safety of patient care
- We need to work together
- We need common standards and legislations
- Let us learn from others

Suggested **Pre-requisites** for eHealth and EHR **success**

- Regulation & Coordination
- Legislation
  - Electronic Transactions legislation
  - Electronic signature
  - Software and data licensing
  - Privacy and security and compliance with HIPAA & GDPR
- Standards for data storage and interoperability
- Database
  - Databases and codes for professionals, hospitals, insurers, citizens, etc..
  - Unique Object Identifiers (OID)
  - Unique national health services users identifier
- Infrastructure
  - Central or distributed servers
  - Fiberoptic lines
  - Interface systems
- Human resources capacity building
  - Health workers IT skills
  - Citizens IT skills
  - IT workers advanced skills
- Non human resources
  - Funding
  - Modes of operations

Terminology standards (Giannangelo, 2015)

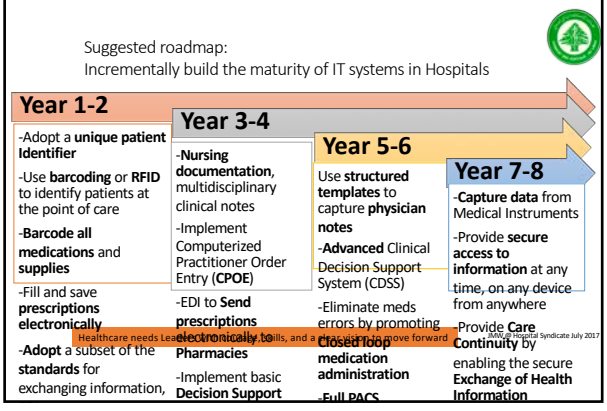
- Diagnoses
  - ICD-9, ICD-10, ICD-11
  - Diagnosis-related groups (DRG)
- Drugs
  - National Drug Code (NDC)
  - National Drug File Reference Terminology (NDF-RT)
  - RxNorm/RxTerms
- Laboratory
  - LOINC
- Procedures and diagnostic studies
  - CPT-4, HCPCS, CDT
- Nursing
  - NANDA, NIC/NOC, Omaha, etc.
- Literature
  - Medical Subject Headings (MeSH)
- Devices
  - Universal Medical Device (UMD) Nomenclature
- Comprehensive
  - SNOMED Clinical Terms (CT)
  - Unified Medical Language System (UMLS)
- Others
  - DSM, ICF, ICPC, commercial, etc.

Suggested EHR essential **functionalities**

- Organize Patient Data
  - Patient Demographics
  - Clinical/Encounter Notes
  - Medical History
  - Record Patient-Specific Information
  - Patient Consent
  - Generate Reports
  - Advance Directives
- Compile Lists
  - Medication Lists
  - Allergy Lists
  - Problem/Diagnoses Lists
- Receive and Display Information
  - Laboratory Test Results
  - Radiology Results
  - Radiology Imaging Results
  - Capture External Clinical Documents
- Order Entry (CPOE)
  - Electronic Prescribing
  - Reorder Prescriptions
  - Laboratory Order Entry
  - Radiology Order Entry
- Decision Support
  - Reminders for Care Activities
  - Dosing Calculator
  - Preventive Services
  - Drug Alerts
  - Disease or Chronic Care Management
  - Knowledge Resources
  - Clinical Guidelines
- Communication and Connectivity
  - Electronic Referrals
  - Clinical Messaging/ E-mail
  - Medical Devices
- Administrative and Billing Support
  - Scheduling Management
  - Eligibility Information
  - Electronic Billing/ Integration with Practice Billing System
  - Drug Formularies
  - Clinical Task Assignment and Routing
- Other
  - Immunization Tracking
  - Public Health Reporting
  - Patient Support

Dullabh, P., A. Moiduddin, and E. Babalola, *Measurement of the utilization of an installed electronic health record*. 2010.

Suggested roadmap:
Incrementally build the maturity of IT systems in Hospitals



Building Consensus on the readiness for EHR in Lebanon

Joe-Max Wakim, BEng, MSc

June 15, 2019

EHR READINESS

BUILDING CONSENSUS ON THE READINESS FOR EHR IN LEBANON

Mr. Joe-Max Wakim

Director, AUBMC - IT Medical Center Processes and Systems
Email: jmw@aub.edu.lb

Leads the AUB Medical Centre Information Technology team. His team works closely with healthcare leaders and stakeholders on strategic initiatives and clinical transfor- mation journeys. They recently implemented Epic with integrations to dozens of other solutions which were purchased or built in-house over the last couple of decades. He also serves on the national IT committee of the syndicate of hospitals in Lebanon and is also currently serving as the president of the Lebanese Healthcare Management Association (LHMA). He is also a HIMSS Certified Professional and Certified Health CIO from CHIME.

Focus Group Discussions

IT Focus Group **April 24, 2019**	• IT specialists from healthcare institutions, public and private hospitals, primary health care centers and ministries.
Payers' Focus Group **April 24, 2019**	• Representatives from third-party payers including private insurance companies, the National Social Security Fund, the Civil Servants Cooperative, Military Schemes and non-governmental organizations
Hospitals' Focus Group **April 25, 2019**	• Representatives from Lebanese private hospitals (directors, administrators and mangers).
Public Sector Focus Group **May 28, 2019**	• Representatives from Lebanese Order of Physicians, Syndicate of Private Hospitals, Lebanese Order of Nurses, and governmental authorities (ministries, army and government institutions)

Guiding Questions for the Focus Group Discussions

Transitory questions

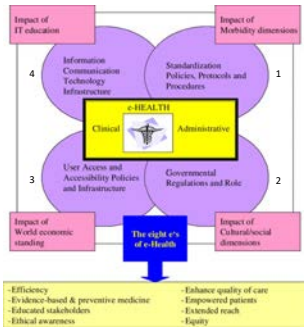
Q1. Why do you think EHR has not yet rolled out in Lebanon?
Q2. What do you think is the most important factor of success of EHR?
Q3. How soon do you expect it to be implemented?
Q4. What would you like to see added to the current means and channels of operations with hospitals?
Q5. What is your organization's objective for implementing an EMR/EHR?

Key questions

Q6. What do you think are the IT related interoperability standards that need to be available so that EHR can be successfully implemented?
Q7. Which of the Pre-requisites for e-Health goals do you think is the most challenging? Why?
Q8. What are the barriers that you expect to face while migrating to or integrating with an EMR and EHR?
Q9. How do you think deploying EHR will reflect on the overall productivity, quality of services and patients' care in the private healthcare sector?
Q10. How would installing an EHR system reflect on your organization's operations?
Q11. What do you think are the necessary legislations for EHR to roll out?

Ending questions

Q12. What are your suggestions to overcome these barriers?
Q13. How do you see things moving?
Q14. How do think this project could be funded?



Emerging Themes From Focus Group Discussions

Dimension 1:
Standardization Policies, Protocols and procedures (Q1, Q2, Q6, Q7 & Q8)

Challenges, barriers & success factors

Emerging Themes From Focus Group Discussions

Dimension 2: Governmen
Regulations and Roles
(Q1, Q4 & Q8)

Challenges & barriers

Emerging Themes From Focus Group Discussions

Dimension 2:
Governmental
Regulations and Roles
(Q2 & Q11)

Success Factors

Emerging Themes From Focus Group Discussions

Dimension 3:
User Access and
Accessibility Policies and
Infrastructure
(Q1, Q2 & Q8)

Challenges, barriers & success factors

Emerging Themes From Focus Group Discussions

Dimension 4:
Information Communication
Technologies
Architecture/Infrastructure
(Q1, Q4 & Q8)

Challenges & barriers

Emerging Themes From Focus Group Discussions

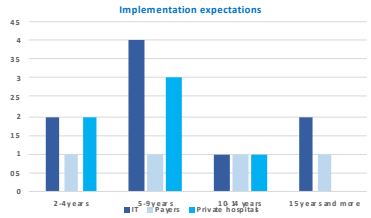
Dimension 4:
Information Communication
Technologies
Architecture/Infrastructure
(Q2 & Q10)

Success Factors

Emerging Themes From Focus Group Discussions

Recommendations from
the three focus group
discussions
(Q4, Q6, Q9, Q11 & Q12)

Responses to how soon EHR is expected to be implemented (Q3)



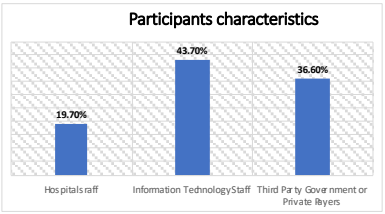
Focus group discussion with the Public Sector

Participants agreed with the themes that emerged from the previous focus group discussions and stressed on the following issues:

- Having a national patient identifier
- Imposing minimum standards to be adopted by the software companies to ensure interoperability
- The ministry of public health should issue a resolution with the requirement for EHR at the national level to be adopted by all hospitals and healthcare institutions.
- Learning from the experience of other countries and not reinventing the wheel
- Planning and implementing this project on the long term since the technology field is evolving rapidly and falling behind is not an option
- Ensuring the security of data

Preliminary findings from the online survey

70 stakeholder filled the online survey. Distribution of respondents is as follow:



Electronic Medical Record Adoption In Hospitals The Lebanese Experience

Youssef Bassim, MD, FACS, MSc Ortho, MHS

June 15, 2019

EHR READINESS

BUILDING CONSENSUS ON THE READINESS FOR EHR IN LEBANON

Dr. Youssef Bassim

Consultant to University of Balamand President for Healthcare and Hospital Affairs, Lebanon
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Dr. Bassim is an orthopedic surgeon and HIT consultant with 20 years of experience in clinical practice and medical administration and lately was CMO in one of the prom- inent hospitals in Kuwait. He is a fellow of the American College of Surgeons and is a Certified Consultant Orthopedic Surgeon by the Saudi Commission for Health Special- ties. He chaired the Management of Information (MOI) chapters for the JCI and CBAHI accreditation systems in his previous work place and became Chief Data and Informa- tion Officer for one of the biggest university hospitals in Lebanon. He was awarded by Dr. Gro Harlem Bruntland, WHO Director General, the Tobacco Free World Award for Outstanding Contributions to Public Health. He was appointed as Project Manager by HIMSS (Healthcare Information Management & Systems Society) on Electronic Medical Records Adoption Model (EMRAM) project in Lebanese hospitals and currently, as healthcare consultant, he is supervising the construction of two big healthcare facilities and is an HIT consultant for one of the largest pharmaceutical industries in the region. Apart from his educational activities, he is teaching Business Intelligence in Healthcare for graduate students. Previously, he was part of the HIT team at the Lebanese Ministry of Public Health and was involved in coordinating with all healthcare stakeholders in Lebanon to create the blueprints and roadmap for the e-health project on a national level. Along the same lines, he put a plan to transform the MOH from a semi manual organization all the way to a real e-facility

Healthcare globally is shifting towards value-based delivery models with a strong focus on enhancing the role of technology:

TO INCREASE THE QUALITY OF CARE

TO OPTIMIZE THE USE OF DATA TO MANAGE POPULATION HEALTH

TO DECREASE OVERALL HEALTH CARE EXPENDITURES

EHR is not an IT solution / project

EHR is a clinical application

End-users

- Physicians
- Nurses
- Patients
- Paramedical team
- IT team(s)

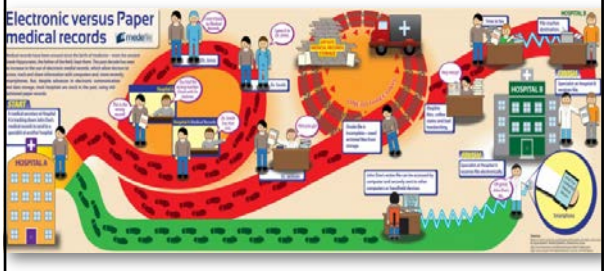
What do we expect from EHR?

BENEFITS OF EHR (US top decision makers)

In his 2004 State of the Union address, President **George W. Bush** stated, "By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care."

Hillary Clinton, announced a proposal to introduce legislation to encourage development of a national health information infrastructure, including the adoption of EHRs.

In February 2009, President Obama stated in his speech to Congress : "Our recovery plan will invest in electronic health records and new technology that will reduce errors, bring down costs, ensure privacy, and save lives,"

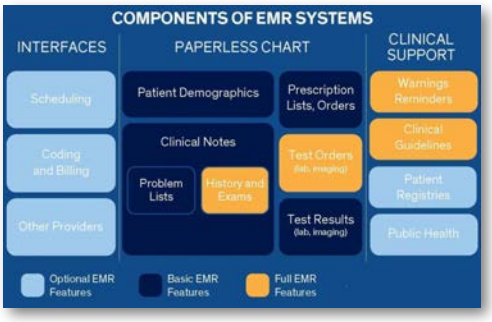


Benefits to Patients

- An increase in patient safety through a reduction in medical and clinical adverse events
- Improved communications between the patient and the caregiver
- Reduction in length of stay due to improved operational efficiency
- Rapid intervention during critical periods of care facilitated by real time alerts and reminders
- Improved medications management
- More Access to electronic media & social information

Benefits to Healthcare Professionals

- A work environment attractive to care providers
- Enhanced ability for clinicians to coordinate care because of simultaneous access to the electronic record
- Decreased number of avoidable clinical incidents
- Reduction in transcription, legibility and omission errors
- Reduced time locating/collecting patient information
- Reduction in administrative tasks, clinicians will have more time to communicate with patients about their care and needs



	EHR	Vs. EMR
Scheduling & billing integration	✓	✓
ePrescribing	✓	✓
Lab ordering and review	✓	✓
Data collection	✓	✓
Internal reporting and tracking	✓	✓
Patient Documentation Participation	✓	
Patient Access	✓	
Data can be electronically shared outside practice	✓	
Digital patient communication	✓	
External tracking and reporting	✓	
Secure data access off premises	✓	
Health information exchange compatibility	✓	

MYTH:

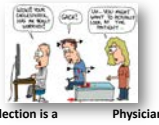
If we could only find the 'perfect' EMR, everything would fall into place

EMRs are complex systems requiring multiple services to go right:

REALITY:

- EMR is a 'mission critical' application required every 10 min in primary care, unlike billing which has a higher tolerance for failure
- Training is essential / difficulty in finding training places
- Hardware configuration and installation
- Software and Hardware support
- Implementation planning --Practice Management consulting and change management
- A computer lab needed to test new software and hardware --before using it in a production setting in a busy clinic
- EMR is like Enterprise Resource Planning (ERP) software

Physicians' Perspective



The physician approach to EMR selection is a telling clue to our approach to EMRs

We judge the EMR by its interface and by its features

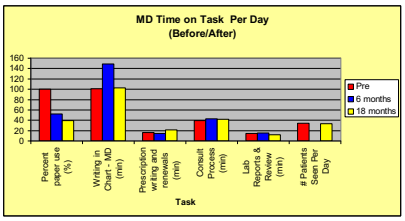
Quite different from IT or administrator approach

Physician expectations are much, much greater than the technology can deliver today

We expect that technology will:

- Improve our productivity and streamline our workflow
- Support us in good clinical decision-making (I.e., have medical 'common sense')
- Make information more accessible
- Save us money

Workflow Change



BARRIERS

The lack of EHR implementation until recent years may have been due to:

- Lack of standards
- Unknown costs and return on investment
- Difficulties operating EHR systems
- Significant changes in clinical/clerical processes
- Lack of trust and safety

Financial Barriers

- Cost
- Business case
- High initial physician time, costs
- Lack of incentives

Organizational Change Barriers

- Fear of slower Workflow and lower productivity
- Migration from paper
- Problems in Customizing and reorganizing templates & workflow
- Staff training

Technological Barriers

- Lack of standards
- Information infrastructure
- Inadequate data exchange
- Fragmentation
- Inadequate technical support
- Commercial products
- Office & providers attitudes and culture
- Technical competency
- Lack of Leadership

Other Barriers

Consumer Barriers

- Consumer acceptance
- Privacy

Social Barriers

- Data Security and privacy
- Legal
- Health care settings
- Stakeholder support

Facilitators for EHR Implementation

- Financial
- Technical
- Psychological
- Social
- Change Management

Financial Facilitators

- Provide documentation on return on investment
- Show profitable examples from other EMR implementations
- Provide financial compensation

Technical Facilitators

- Educate physicians and support ongoing training.
- Adapt the system to existing practices
- Implement EMR on a module-by-module basis
- Link EMR with existing systems
- Promote and communicate reliability and availability of the system
- Acquire third party for support during implementation

Timeline

- Provide support during implementation phase to convert records and assist
- Provide training sessions to familiarize users
- Implement a user friendly help function and help desk
- Redesign workflow to achieve a time gain

Psychological Facilitators

- Discuss usefulness of the EMR
- Include trial period
- Adapt system to current medical practice
- Demonstrate ease of use
- Start with voluntary use
- Let fellow physicians demonstrate the system

Social Facilitators

- Discuss advantages and disadvantages for doctors and patients
- Information and support from physicians who are already users.
- Ensure support, leadership, and communication from management

Legal Facilitators

- Develop requirements on safety & security in cooperation with physicians & patients
- Ensure EMR system meets these requirements before implementation.
- Communicate on safety and security of issues

Change management

- Select a project champion; preferably an experienced physician
- Let physicians (or representatives) participate during the implementation process
- Communicate the advantages for physicians and use incentives
- Ensure support, leadership, and communication from management

Return on Investment (ROI)

- Full cost of an EHR
- Measurable Financial ROI
- ROI Calculator

The full cost of an EHR includes:

- the software purchase price
- additional computer hardware
- implementation including the training of staff
- customization of the system
- ongoing technical support
- system maintenance
- future program upgrades.

Measurable financial ROI includes:

- increase in income from more accurate coding
- greater time efficiency as a result of rapid chart documentation
- expanded patient load because of this efficiency
- reduced office supply costs such as paper and printing supplies.

EMR ROI / EHR ROI Calculator

- The following Calculator can help you estimate how much cost you can expect to save by implementing an EMR or an EHR system

http://www.4medapproved.com/research_tool_ROIcalc.php

When health-care providers complete their documentation on an EHR, the need for a transcriptionist is often eliminated. This efficiency has generated an estimated savings of $300 to $1,000 or more per month per physician.

Often, undercoding occurs by medical providers. However, with an EHR, more accurate level-of-care coding is based on documentation from the review of systems and examination within the office visit assessment.

EHRs help recover lost revenue for the practice. Malpractice insurance carriers are considering or currently giving discounts to their insured when an EHR is utilized.

Return on Investment (ROI)

Costs are quite high --$800-1200/month/physician

Financing EMR systems is a major challenge to sustainability

New evidence shows great benefit for insurers and payors --$86,000 per physician over 3 years

Other jurisdictions (Australia, UK, Europe) have had great success with EMR when payors subsidize the costs

High rates of EMR failures increases the perceived cost --failures are as high as 75-80%

Issue: Cost-Value-Price

EMR Adoption Model HIMSS History

HIMSS transforming healthcare through IT

Healthcare Information Management Systems Society (HIMSS)

An organization exclusively focused on providing global leadership for the optimal use of healthcare information technology (IT) and management systems for the betterment of healthcare.

Electronic Medical Record Adoption Model, Healthcare Information Management Systems Society (HIMSS), www.himss.org

HIMSS Analytics

"The **E**lectronic **M**edical **R**ecord **A**doption **M**odel **EMRAM** and **A-EMRAM**(Ambulatory EMRAM) benchmarks ensure hospitals are effectively utilizing strategic information technology investments according to a proven prescriptive approach.

The EMRAM model helps hospitals and clinical / ambulatory practices track and benchmark their EMR adoption and utilization".

HIMSS Analytics EMRAM
Learn more about EMRAM and get your score

EMR Adoption Model HIMSS Analytics

- HIMSS Analytics created the EMR Adoption Model™
  - –Hospital based
  - –Stages 0 - 7
- Developed a methodology and algorithms to score hospitals surveyed relative to their IT-status
- Provides peer comparisons reports

HIMSS Analytics EMRAM
Learn more about EMRAM and get your score

EMR Adoption Model (EMRAM) - 2005

Stage 7	Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS
Stage 5	Closed loop medication administration
Stage 4	CPOE, Clinical Decision Support (clinical protocols)
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology
Stage 2	CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable
Stage 1	Ancillaries – Lab, Rad, Pharmacy – All Installed
Stage 0	All Three Ancillaries Not Installed

HIMSS Analytics

Times have changed

- It was time for more significant changes
  - Needed to better reflect current state of an advanced EMR environment
  - All stages were affected
  - Time to raise the bar globally
- Focus more on functions accomplished and less on technology itself
  - How is technology used to improve care quality and patient safety?

HIMSS Analytics

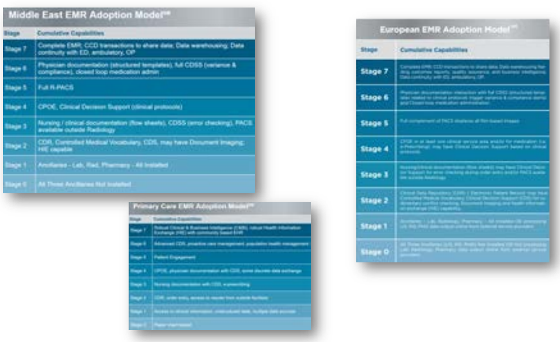
EMR Adoption Model (EMRAM) - 2018

Focus more on functions accomplished and less on technology itself

How is technology used to improve care quality and patient safety?

STAGE	HIMSS Analytics EMRAM EMR Adoption Model Cumulative Capabilities
7	Complete EMR; External HIE; Data Analytics, Governance, Disaster Recovery, Privacy and Security
6	Technology Enabled Medication, Blood Products, and Human Milk Administration; Risk Reporting; Full CDS
5	Physician documentation using structured templates; Intrusion/Device Protection
4	CPOE with CDS; Nursing and Allied Health Documentation; Basic Business Continuity
3	Nursing and Allied Health Documentation; eMAR; Role-Based Security
2	CDR; Internal Interoperability; Basic Security
1	Ancillaries - Laboratory, Pharmacy, and Radiology/Cardiology information systems; PACS; Digital non-DICOM image management
0	All three ancillaries not installed

HIMSS Analytics



▶ Programme MHS(7)
Master Management de l'Hôpital et de la Santé
AMES - Analyse Management des Etablissements de Santé

Janvier 2012

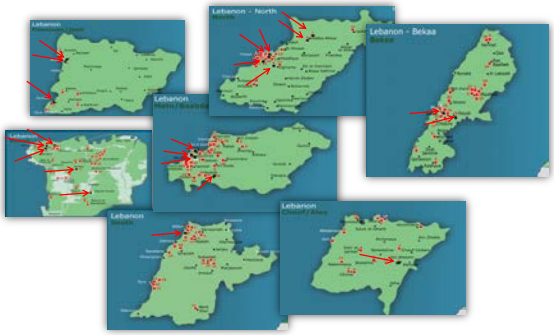
ESA

PARIS DIDEROT

Master Management de l'Hôpital et de la Santé (07)
Promotion 2012

MASTER PROFESSIONNEL M2
Analyse et Management des Etablissements de Santé - AMES

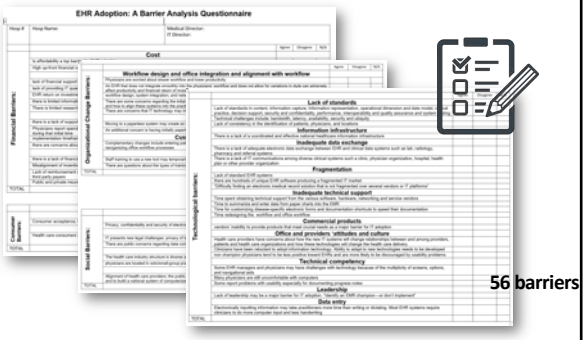
A National Survey on Electronic Medical Record (EMR) Adoption in Lebanese Hospitals; Barriers and proposed solutions for implementation.



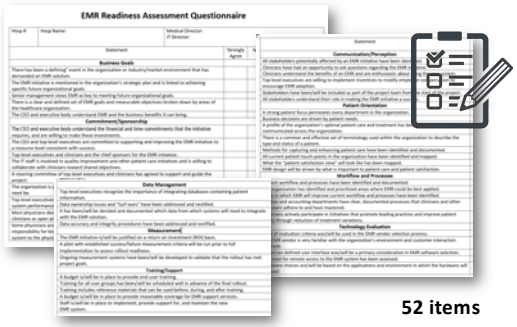
Method

- Two standard questionnaires: Hospital readiness and barriers facing hospital for EMR implementation
- EMRAM scoring model adopted by HIMSS

All sent to the IT director of each hospital in order to fill in which stage the hospital is operational.



56 barriers



52 items

The survey strategy depends on the objectives which are guided by the following research questions

01

1) What are the different interests and expectations of the managers and the health staff, and how they should be aligned in order to adopt EMR system?

02

2) What are the challenges of the managers and problems faced by the end-users while transitioning their practice from paper to PC?

03

3) What are the strategies adopted by managers to overcome barriers faced by while implementing the EMR?

2012

Weak understanding of EMR adoption in hospitals with lack of knowledge about its benefits. Out of those 50 hospitals that were contacted, only 23 hospitals responded.

2012

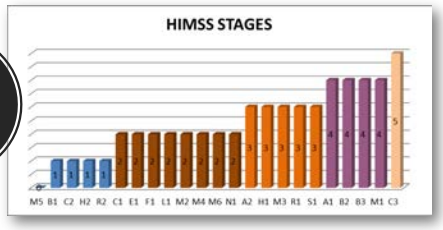
the stages status of the surveyed hospitals was linked to their bed capacity, accreditation category and academic status.

Bed size capacity had no relation with stage level whereas there was a trend that academic hospitals or those who had higher accreditation category had higher HIMSS stage.

Most of the hospitals faced similar adoption barriers known internationally and most IT directors expressed their well position for their readiness for EMR implementation process.

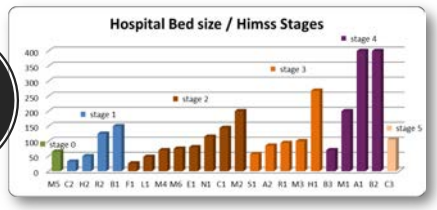
2012

HIMSS STAGES



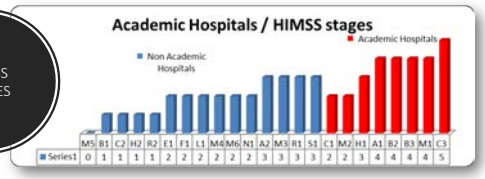
2012

HIMSS STAGES



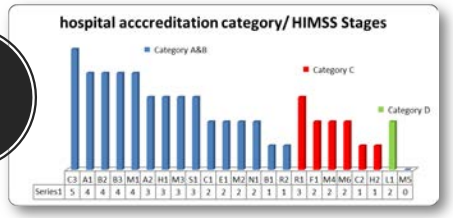
2012

HIMSS STAGES



2012

HIMSS STAGES



Lebanon v/s North America

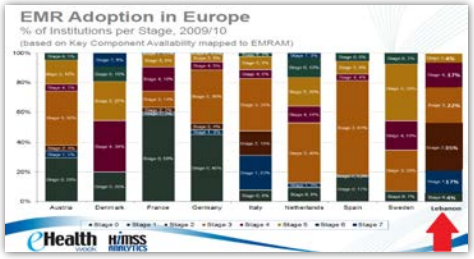
2012

EMR Adoption Model[SM]

Stage	Cumulative Capabilities	CAN	USA	LEB
Stage 7	Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP	0.8%	1.1%	0 %
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS	0.5%	4.4%	0 %
Stage 5	Closed loop medication administration	0.2%	7.1%	4 %
Stage 4	CPOE, Clinical Decision Support (clinical protocols)	1.7%	13.2%	17%
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	33.2%	46.1%	22%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable	23.9%	12.9%	35%
Stage 1	Ancillaries - Lab, Rad, Pharmacy - All Installed	12.2%	5.9%	17%
Stage 0	All Three Ancillaries Not Installed	28.3%	9.6%	4 %

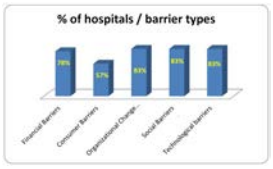
Lebanon v/s Europe

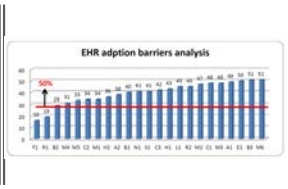
2012



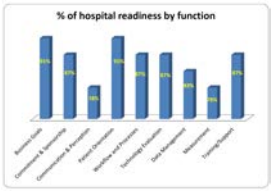
EHR Adoption Barrier Analysis

2012





EHR Overall Readiness



Limitations of the survey

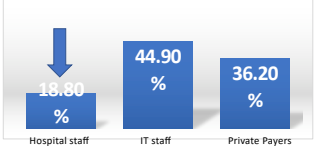
2012

- Selection of the 50 hospitals out of 117 private and 8 public hospitals based on their high activities
- Out of the 50 preselected hospitals, the more interested and more **ready** hospital for EMR adoption responded
- The detailed spread sheet used by HIMSS analytics was not used because of the high resistance of IT directors to comply
- The managing and medical directors were not included in this survey

2019

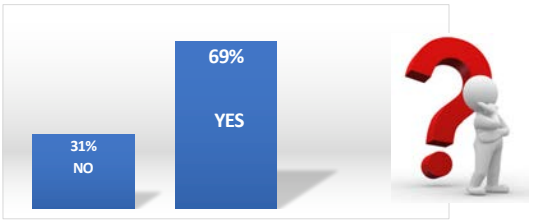
Participants characteristics

Administration...)	14
Information Technology staff (IT staff, IT Leadership...)	31
Private Payers (Insurance, Social organizations...)	26
Total	71



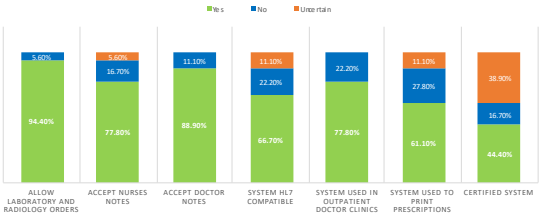
Does your organization have an Electronic Health Record (EHR)?

2019



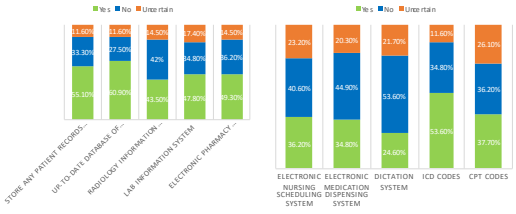
EHR Current Status

2019



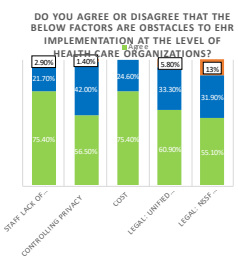
EHR modules

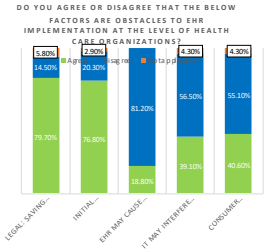
2019



BARRIERS

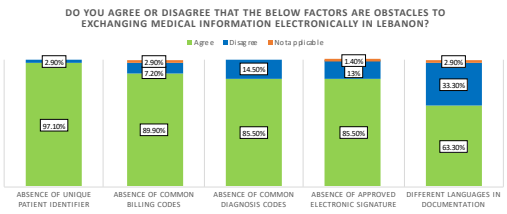
2019





Obstacles to e-Exchange of Medical Information

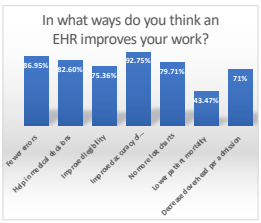
2019

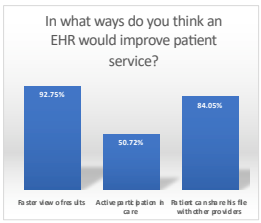


READINESS

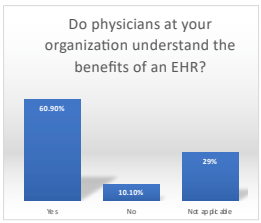
2019

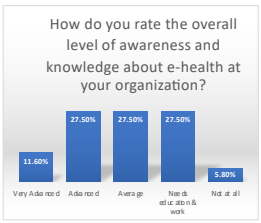
READINESS 2019



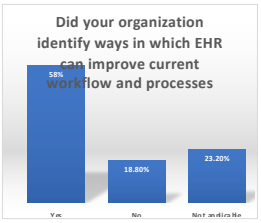


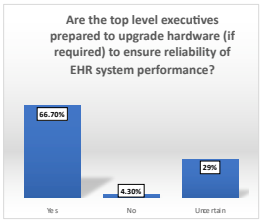
READINESS 2019





READINESS 2019





More on the Value of EMRAM

How are hospitals & clinics scored ?

The HIMSS Analytics EMRAM incorporates methodology and algorithms to automatically score hospitals around the world relative to their EMR capabilities.

The process is **fully confidential**, which defuses all concerns any hospital might have on which stage the assessment places them in.

How do hospitals and clinics benefit from EMRAM?

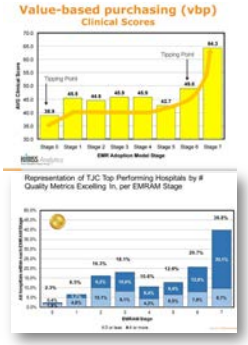
EMRAM Assessment provides **guidance** to hospitals in a swiftly changing ecosystem.

The report provides insights on **hospital clinical services quality, patient safety, and operations efficiency**.

The assessment produces **solid data and meaningful statistics** that is well structured and presented with defined correlations to the EMR adoption maturity model.

In addition to highlighting areas of improvements, benefits realization, and **ROI indicators** play a major role guiding healthcare organizations' strategies and driving technology investments.

Relations between EMRAM stage on Quality and value-based purchasing



EMR Adoption Model

- All lower stages must have been achieved before a higher level is considered as achieved
- A hospital can achieve Stages 3-6 if it has met all of the application requirements for a single patient care service (e.g., single nursing floor, cardiology service)
- It's important to note that initial assessments for all stages (except 6 & 7) can be conducted remotely through the EMRAM annual study, whereas stage 6 & 7 surveys are conducted through on-site visits conducted by HIMSS-lead teams.

Electronic Medical Record Adoption Model, Healthcare Information Management Systems Society (HIMSS), www.himss.org

EMR Adoption Model

- This assessment collects detailed HIT data and tracks the implementation and adoption of EMR applications through each stage of the EMR Adoption Model.
- It's important to note that initial assessments for all stages (except 6 & 7) can be conducted remotely through the EMRAM annual study, whereas stage 6 & 7 surveys are conducted through on-site visits conducted by HIMSS-lead teams.
- **Three outcomes expected from the participation in the EMR evaluations:**
  - Hospital's EMRAM Score
  - Gap Assessment Reports
  - Benchmarking Reports

EMRAM History & breakdown: Gulf region

- As of today, hundreds of hospitals and thousands of ambulatory clinics have received the Stage 7 EMRAM and A-EMRAM awards across the USA.
- In the Gulf region, **23** sites in total have achieved stage **6 & 7 EMRAM** as shown below:

Stage	Facility Count	Location
Stage 7 Hospitals	1	KSA
	1	UAE
Stage 7 Primary Care Facilities	1	KSA
Stage 6 Hospitals	14	UAE
	4	KSA
	2	Qatar
Stage 6 Primary Care Facilities	0	N/A

Hospital management and IT directors level

RECOMMENDATION

- Hospitals should allocate more funding for HIT projects.
- The IT director should be part of the decision making body of the hospital.
- Provide continuous training for all IT staff
- The hospital should create an IT environment
- Hospitals should participate in regional information networks and with
- Collaborate with other healthcare organizations to control costs
- Hospitals should conduct researches on economic issues for the development and maintenance of the EMR system.

Health Authorities level (Ministry of Public, Third party payers and Syndicate of hospitals):

RECOMMENDATION

- The EHR standards should be put as an integral part of any accreditation process.
- Awareness about the high demand of HIT careers and the coordination with universities to create both undergraduate and post graduate programs in HIT
- coordination with international organizations and societies such as HIMSS
- Provide grant funding and Provide payment incentives
- Facilitate development of national standards and code sets
- legal definition of EHR/EMR and regulations should be defined to regulate the content, structure, ownership & preservation of medical records.

In Conclusion

- Champions Identification
- Right Leadership
- Shared Vision
- Right Culture
- Governance / decision making
- key stakeholders are engaged early and accountable to lead the clinical transformation

Building an E-Health Roadmap : Key Learnings from France, Denmark and other European countries

Karim Hatem

June 15, 2019

EHR READINESS

BUILDING CONSENSUS ON THE READINESS FOR EHR IN LEBANON

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Mr. Karim Hatem

Senior Partner at Ylios Executive consulting, France

Email: khatem@ylios.com

Mr. Hatem is the Senior Associate Director and one of the founders of Ylios Executive Advisory. During his 30 years as a consultant, he developed a wide range of competencies and skills including:

- Strategic planning, both at the level of the economic sectors where he has an expertise (Healthcare, Energy, Telecom, Engineering, Infrastructure and Construction, Banking and Insurance), as well as at the level of companies and public operators
- Designing new strategic models, resulting from innovative approaches, and the establishment of new organizations and businesses, in addition to contributing to their performance improvement
- Supporting the implementation of these new models across these sectors and at company level, with a focus on digital transformation
- Consulting to Executive Teams in the Private and Public Sectors in the steering of large and complex transformations.

Over the past 15 years, he has worked with various stakeholders in the healthcare sector including: healthcare operators, pharma and medtech companies, equipment manufacturers, regulatory authorities, "New Entrants" such as La Poste with its "Silver Economy" development program.

REPUBLIC OF LEBANON
MINISTRY OF PUBLIC HEALTH

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Building an E-Health Roadmap : Key Learnings from France, Denmark and other European countries

Beirut, Saturday June 15th

0 Context on E-Health

Presentation of Ylios – E-Health is a core issue

Healthcare and life sciences sector

Our sectors of intervention

Our domains of excellence

- Strategy, Foresight, Regulation & Economics
- Organisation Governance & Performance Management
- Leadership, Management & Transformation
- Innovation & Digital Transformation
- Economic Intelligence and Influence

Health, life sciences & Public Institu-tions | Energy & Utilities | Infra-structure and networks | Transpor-tation Enginee-ring and construc-tion | Telecoms and digital players

Innovation and digital transformation

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0 Context on E-Health – The starting point for Lebanon's roadmap

Definition of the e-health : A comprehensive vision with a large scope, beyond EHR

The term e-health refers to areas serving health, as defined by the World Health Organization in 1945: **« Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity ».**

The first use of the term "e-health" probably dates back to **1999**. In a presentation at the 7th International Congress of Telemedicine - or distance medicine - John Mitchell, an Australian consultant in the field of health, defines it as:

> ***The combined use of the Internet and information technology for clinical, educational and administrative purposes, both locally and remotely.***

According to WHO...

- E-health is defined as "**digital services for the well-being of the person**". It is also defined as "the use of tools for producing, transmitting, managing and sharing digitized information for the benefit of both medical and medico-social practices".
- More generally, **e-health now encompasses the innovations in the use of information and communication technologies** for all activities related to health.
- E-health helps to provide answers that will preserve the fundamentals of the health care system while **increasing its added value for both professionals and patients:**

1. Prevention
2. Wellbeing
3. Care
4. Accompaniment
5. Information

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0 Context on E-Health – The starting point for Lebanon's roadmap

A preliminary roadmap has already been established

Suggested roadmap:
Incrementally build the maturity of IT systems in Hospitals

Year 1-2

- Adopt a **unique patient identifier**
- Use **barcoding** or **RFID** to identify patients at the point of care
- **Barcode all medications** and **supplies**
- Fill and save **prescriptions electronically**
- Adopt a subset of the **standards** for exchanging information, EDI
- **Basic PACS**

Year 3-4

- **Nursing documentation**, multidisciplinary clinical notes
- Implement Computerized Practitioner Order Entry (**CPOE**)
- EDI to **Send prescriptions** electronically to **Pharmacies**
- Implement basic **Decision Support System**
- **Analytics** (Data Warehouse)
- Measure outcomes

Year 5-6

- Use **structured templates** to capture **physician notes**
- **Advanced** Clinical Decision Support System (CDSS)
- Eliminate meds errors by promoting **Closed loop medication administration**
- **Full PACS**

Year 7-8

- **Capture data** from Medical Instruments
- Provide **secure access to information** at any time, on any device from anywhere
- Provide **Care Continuity** by enabling the secure **Exchange of Health Information**

Healthcare needs Leaders with courage, skills, and a clear vision to move forward

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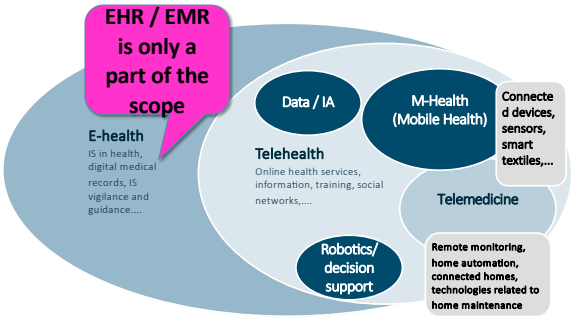
0 Context on E-Health – The starting point for Lebanon's roadmap

The components and perimeter of E-Health



A very large perimeter, driving the way to 4P medicine : Predictive, Preventive, Participative, Personalized,

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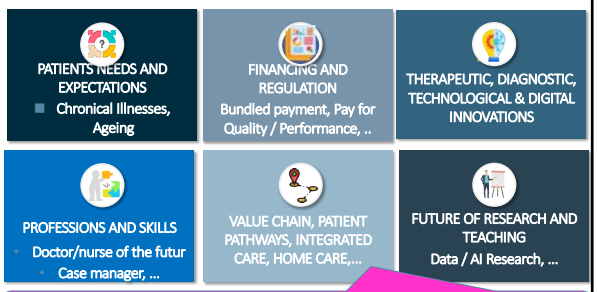
0 Context on E-Health – The starting point for Lebanon's roadmap

The six prospective dimensions



6 dimensions to build a systemic and integrated vision of what Healthcare will be in medium, long and very long term

0 My purpose today

- **What I will (try to) do**
  - Give a comprehensive vision, objective, documented and
  - Leverage lernings from international experiences
  - Provide practical and applicable learnings and insights
  - Highlight key messages based on evidence and real feedback (based on 12 focused interviews with key executives)
- **What I will not do**
  - Read the slides in detail : we would
  - Give a technological oriented speech
- **What I hope you will not do**
  - Read the slides in detail (you have the possibility to download the presentation)
- **What I hope you will do**
  - Ask questions
  - Challenge my presentation and generate discussion and debate

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2 Issues for Lebanon EHR strategy

Professionals / experts who have been helping us

Many thanks to ...

Yannick LE GUEN	VP Strategy at ARS Île-de-France (Ile de France region Health Authority) Former Director of Performance and IT programs at DGOS
Mikael AZOULAY	Director of Digital Transformation and IS/IT at Gustave Roussy (Cancer Center) and former ASIP Exec (EHR /E-Health Standard setting agency)
Elie LOBEL	CEO of Orange Healthcare and Enovacom (Interoperability Hub) Former e-health project department Director – ASIP Santé
Hervé RIVIERE	France medical director – INTERSYSTEMS software editor Previously at ARS Midi-Pyrénées
Hervé BARGE	Directeur Général Agence Nationale ESanté in Luxembourg
Frederic GENTA	Chief Digital Officer of the Principauté de Monaco
François CREMIEUX	Deputy CEO of AP-HP
Pierre-Etienne HAAS	Organisation and digital Transformation Steering Director AP HP
Madis TIIK	CEO of the Estonian E-Health Foundation
Pierre BOIRON	CEO of GCS Sesan
Laetitia Messner	Strategic Partnerships Director chez Quantum Surgical SAS – Former Program Manager of the « Hôpital Numerique » Program

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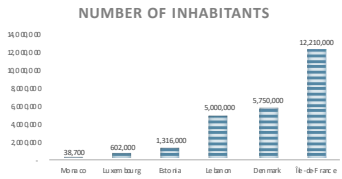
Summary

1 A selection of countries for key learnings on E-Health Roadmaps

Benchmark étranger: pioneer countries and regions in e-health strategy



	Monaco	Luxembourg	Estonia	Lebanon	Denmark	Ile de France (Paris region)
Population (in millions)	0,39	0,6	1,3	5	5,7	12,2
Area (Km²)	2	2 586	45 227	10 400	43 094	12 012
GDP per capita ($US)	162 000	104 100	19 700	8 500	59 831	54 800
Healthcare expenditure as a share of GDP	4,3%	6%	6,5%	6,4%	10,3%	11,5%
Healthcare expenditure per capita ($US)	7 302	6 812	1 668	987	4 782	4 500

1 Monaco – An comprehensive E-Health roadmap built through a collaborative process

A global view of pre-requisites, action plans and solutions to implement

Solutions to be implemented

1. Making appointments online
2. Teleconsultation
3. Tele-expertise
4. Automated hospital admittance
5. Documentary base
6. PACS
7. Secure messaging
8. IoT for Home Care (Hospital at Home)
9. IoT for prevention
10. Dematerialization of care sheets (current/non-exhaustive co…
11. Tele management
12. National Identity Card
13. Connected Personal Health Record
14. Monaco Télégestion

Other solutions : Sovereign cloud, Big data, Robotics, Artificial intelligence

Prerequisites

A. Professional directory
B. Legal – status of medical data
C. Data format and interoperability
D. Agreements with foreign partners
E. RGPD respect- security
F. Unique ID number

Online appointments scheduling is the N°1 service

EHR is left to hospitals (3 acute hospitals in Monaco)

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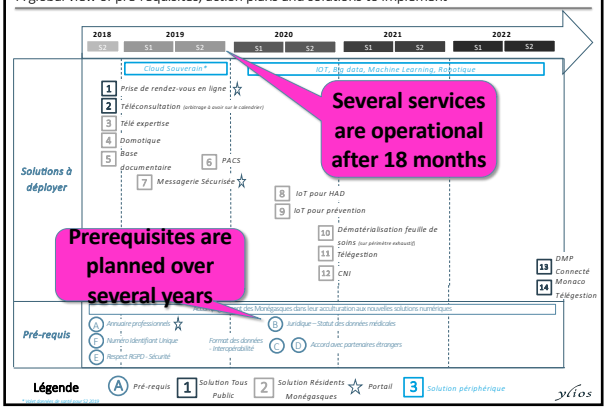
1 Monaco – An comprehensive E-Health roadmap built through a collaborative process

A global view of pre-requisites, action plans and solutions to implement



Several services are operational after 18 months

Prerequisites are planned over several years

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1 Estonia and Luxembourg – Two Leaders in E—Health Strategy implementation

Key learnings from international benchmark

Two examples of e-Health disruptive and oustanding strategy implementations in terms of content, organization and governance

Luxembourg

- **Number of inhabitants :** 602 000 inhabitants (with 52% of Luxembourgers)
- **Population:** with a 50%-cross-border population
- **Number of incumbent doctors for 1000 inhabitants :** 2,9 (3,4 OCDE)
- **% of the population with health insurance:** 95,2% (97,2% OCDE)

Estonia

- **Number of inhabitants :** 1 315 635 inhabitants
- **Number of incumbent doctors for 1000 inhabitants :** 3,4 (3,4 OCDE)
- **% of the population with health insurance: :** 94% (97,2% OCDE)

1 Estonia – An early adopter nation

Key learnings from international benchmark

E-Health part of a global « E-Estonia » Initiative, started in the 90s

ESTONIA

The Digital Health system is part of online public services « e-Estonia ». It also manages a large array of functionalities: tax declaration, business records, online elections or cyber schools.

EHealth Foundation has been created in **2007** to develop e-Health services in Estonia. In fact, its mission is to manage and develop the information system of health and to ensure the coordination between different medical services.

This mission is based on three axes:

Mission includes the development of Health System organization

- **Management and development of health information system**
- **Standardization of documents and electronic data, delivered by various health p…**
- **Development of health system organization. It includes partnerships with Estonian private actors and cooperation with other European countries (ex: Finland)**

The use of cyber health was the subject of a legislation :

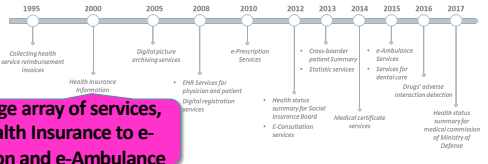
- **The law on health information system (2007)**
- **Government regulation relative to information exchanges on health (2008)**

1 Estonia – An early adopter nation

Implementation has started back in the 90s with a continuous implementation of new services

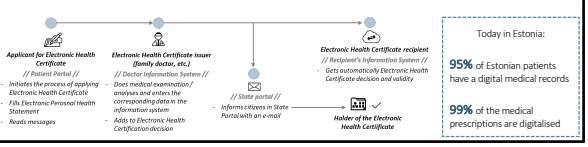
ESTONIA

The evolution of e-health services in Estonia since 1995



A very large array of services, from Health Insurance to e-Prescription and e-Ambulance

« Electronic eHealth Record » (launched in 2005) : a national system
That allows the online access to the whole medical data of the patient



Today in Estonia:

95% of Estonian patients have a digital medical records

99% of the medical prescriptions are digitalised

1 Estonia – An early adopter nation

Implementation has started back in the 90s with a continuous implementation of new services

ESTONIE

The electronic medical record

- Launch of its electronic medical record system **in 2008 : 1er pays au monde à mettre en œuvre un tel système à l'échelle nationale.**
- Records cover an individual's medical history from birth to death.
- In 2009, the country uploaded all medical documents into the system : **health information of 1,350,000 people (98% of the population) are now listed in the system.**

The digital prescriptions

- **Online prescriptions system** : allows physicians to send their prescriptions to a national database accessible to pharmacies, other physicians and the health insurance fund. Patients can pick up their medications at any pharmacy on presentation of their ID card.
- Renewals can be done by email or phone. Therefore **patients go less often to their doctor who can focus on the really necessary visits. Doctors can also follow their patients remotely, and check that they have removed the prescription.**

A portal for patients

A portal for patients, for each citizen to get involved

- Enables each citizen to **get involved in his or her own health journey by easily accessing health data.**

Other services

Digital imaging archives, on-line lab modules

- **Digital imaging archives and online lab modules and online emergencies.**

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1 Luxembourg – An E-Health Agency to accelerate and secure governance

A comprehensive plan and a "agile" and efficient execution

LUXEMBOURG

The Mission of the **e-health agency** is legislated by the social security code. It **ensures better use of information in the health sector and the medico-social sector in order to allow better coordinated patient care**. It promotes continuity of care and good transmission of a patient's medical information, contributing to interoperability.

A dedicated E-Health Agency has been set-up

This mission revolves around two elements :

A platform for sharing and exchanging data (in health) including the shared care dossier

Data exchange platform

A blueprint for health information systems (SDSI) that defines a national health SI interoperability strategy, which enables different health systems to interact effectively.

Blueprint for Health Information systems

The two components essential to the operation of the eHealth platform

L'Annuaire des professionnels de santé (Healthcare Provider Directory - HPD)
Contains information on all health professionals entitled to practice in Luxembourg, as well as on health institutions and structures. It helps to ensure the identity of healthcare professionals who wish to consult a patient's DSP or use the services of the platform.

HCP and Patient Directories as 2 building blocks

L'Annuaire des patients (Master Patient Index - MPI)
The patient directory allows health players to have a unique and shared view of a patient identity.
The master patient index (MPI) manages the prevention and management of risks and errors related to patient identification (concept of identito-vigilance).

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1 Luxembourg – An E-Health Agency to accelerate and secure governance

A comprehensive plan and a "agile" and efficient execution

LUXEMBOURG

A very large array of services beyond EHR

The DSP	The DSP (shared care folder) is the **electronic file for exchanging and sharing health data**. It is a collaborative tool between healthcare professionals and at the disposal of the patient who aims to facilitate communication between the different health players and to ensure continuity in the care management.
Secure messaging	Allows **easy, safe, confidential communication between two health professionals well-known** by the eSanté platform. The forwarded message is encrypted and can only be read by the sender and the recipient. In addition, an authentication mechanism ensures the origin of the messages.
Gecamed	Medical practice management software that helps to **ensure the care of a patient with computerized support by collecting medical and administrative documents** from many other sources. Gecamed also supports all the billing part applicable in Luxembourg.
The referral doctor tool	Service made available to physicians who have signed (together with a patient in possession of an activated DSP) a "referral doctor statement" which allows the referring physicians to **supervise and Exchange health information on the care pathway of a patient with an ALD (long-term condition)** in order to coordinate care and ensure optimal medical follow-up.

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1 Luxembourg – An E-Health Agency to accelerate and secure governance

A comprehensive plan and a "agile" and efficient execution

LUXEMBOURG

Hosted platform for small and unequipped hospitals

IdéoMed	Outil de gestion électronique des dossiers de patients pris en charge dans un établissement, **mis à la disposition des établissements luxembourgeois ne disposant pas de plateau technique**. Le dossier patient informatisé (DPI) IdeoMed dispose des mêmes niveaux de sécurité de la Plateforme eSanté (conservation des données médicales, accès aux données aux personnes autorisées).
L'espace collaboratif	Espace de travail virtuel partagé, destiné aux professionnels, leur permettant **de communiquer, d'échanger, de partager des ressources, de gérer des projets** (planning, participants, budget…) autour d'une pratique, d'un thème, d'un réseau de santé…
L'annuaire des professionnels de santé	L'annuaire disponible sur le portail permet de **retrouver aisément un professionnel de santé, un établissement hospitalier, un centre de soin** ou une autre structure au moyen de mots clé, d'un nom…
La base documentaire	Ensemble de **documents classés par thèmes disponibles en téléchargement pour les patients, les professionnels et autres acteurs du monde de la santé**. Certains thèmes sont privés et réservés uniquement aux professionnels de santé.

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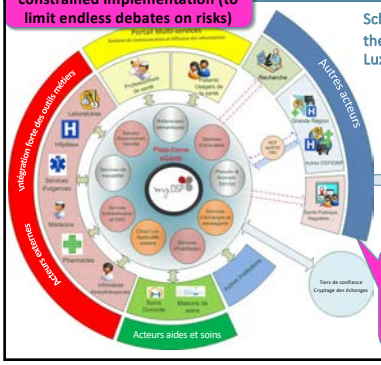
1 Luxembourg – An E-Health Agency to accelerate and secure governance

A comprehensive plan and a "agile" and efficient execution

Key success factor : Agile, time-constrained implementation (to limit endless debates on risques)

LUXEMBOURG

Schéma – E-Health platform in the health ecosystem in Luxembourg



The implementation of an E-health strategy involves implementing a pre-requisite base :

- Secured directory of healthcare professionals
- Identity reconciliation Server
- Authentication and SSO services
- Secure messaging
- …

Large hospitals are autonomous in EHR / EMR systems choise but have to comply to framework

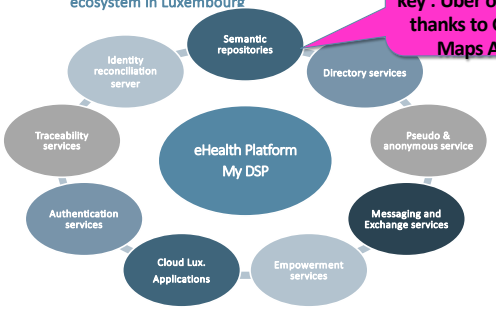
1 Key learnings from other countries experiences

Foreign Benchmark: Luxembourg

LUXEMBOURG

Scheme-platform eHealth in the healthcare ecosystem in Luxembourg

The power of the "platform" model is key : Uber only lives thanks to Google Maps APIs



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1 Denmark – An very comprehensive strategy and implementation

Denmark is very comparable to Lebanon – 5,5 million people

The Danish eHealth and Telehealth plan

A comprehensive and coordinated strategy,

- National EHR and E-health architecture
- International standards
  - HL7
  - Continua Health Allicance
- First fully regional telehealth implementations
- Coordinated strategy:
  - Ministry of Health
  - Danish Regions
  - Danish Municipalities

The eHealth and telehealth strategy will align with the 2013 – 2020 Assisted Living strategy

Identified Use Cases are Targeted Telemedecine , Rehab,

- Full scale implementation of proven solutions
  - Ceiling lifts
  - Digital rehabilitation
  - Selected robot technology
- Full scale Smart Home implementation
- Smart Home technology for disabled citizens
- Coordinated strategy:
  - Ministry of Health and Prevention
  - Danish Regions
  - Danish Municipalities

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1 Denmark – An very comprehensive strategy and implementation

Denmark : Services fir Citizens are central in E-Health policy

SERVICES FOR CITIZENS

- Access to personal health data on treatment
  - E.g. e-Record from hospitals and GPs and Shared Medication Card
- Communication with health care providers
  - E.g. Contact information and e-services like booking, prescription renewals and electronic communication
- General information on health service
  - E.g. quality in health care, patient rights
- Accurate and updated information on health, disease and treatment
  - E.g. medical handbook
- Personal home care/hospital solutions
  - E.g. diabetes and anticoagulant therapy
- Patient to patient dialogue

SERVICES FOR HEALTH CARE PROFESSIONALS

- Access to personal health data on patients
  - E.g. e-Record, laboratory data and Shared Medication Card
- Contact and service information on other health care providers
- General information on health service
  - E.g. waiting lists, quality in health care, health and prevention programs, visitation
- Accurate and updated information on health, disease and treatment
  - E.g. medical handbook, treatment feedback and benchmarking
- Personal home care/hospital solutions
  - E.g. diabetes and anticoagulant therapy

In Denmark too, services to citizens are central to E-Health Strategy

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1 Focus on the French approach to E-Health and EHR

"Hôpital Numérique" (digital hospital)

EHR / EMR is one of 5 programs, with a broad functional coverage

- **Hôpital Numérique : actualité du programme**
- Le SI Convergent du GHT : actualités du dispositif d'accompagnement
- Territoire de Soins Numérique (TSN)
- MS Santé (MSS)
- Le répertoire opérationnel régional (ROR)
- Le socle de sécurité (SSI)

Secured messaging is a key component

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1 Focus on the French approach to E-Health and EHR

"Hôpital Numérique" (digital hospital)

DIRECTION GÉNÉRALE DE L'OFFRE DE SOINS

HÔPITAL NUMÉRIQUE : BILAN ET NOUVELLE FEUILLE DE ROUTE

One major program : « Hôpital Numerique »

Le programme hôpital numérique est la feuille de route nationale des systèmes d'information hospitaliers (SIH) pour la période 2012-2017

Il définit un palier de maturité, caractérisé par :

- ✓ un ensemble de prérequis et cinq domaines fonctionnels prioritaires d'informatisation,
- ✓ que doivent atteindre l'ensemble des établissements de santé.
- ✓ Il est doté de 400 millions d'euros de financement (80 M€ d'amorçage (FMESPP) et 320 M€ de financement en usage (AC))

Le programme HN a bénéficié du soutien des acteurs hospitaliers (FHF, FHP, FEHAP, Unicancer, FNEHAD), a été salué par la cour des comptes.

La DGOS **lance le bilan qui sera réalisé de décembre 2017 à mars 2018**, afin d'orienter la nouvelle feuille de route nationale des SIH sur la période 2018 - 2022

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1 Focus on the French approach to E-Health and EHR

"Hôpital Numérique" (digital hospital)

EHR / EMR is only a part of the scope

IQUE : ACTUALITÉS DU PROGRAMME

HÔPITAL NUMÉRIQUE

Fin au 31/12/2017

Axe 1 : Gouvernance
- Combler les manques de gouvernance SI et favoriser l'implication dans les SI des professionnels de santé et cadres dirigeants
- Intégration de HN dans IFAQ en 2017 : clôture des résultats au 15/11/2017
- Formation MICR

Axe 2 : Compétences
- Renforcer les compétences relatives aux SIH

Axe 3 : Offre
- Stimuler et structurer l'offre de solutions

3 industriels certifiés

Axe 4 : Financement
- Financer un socle de priorités, subordonné à l'atteinte de cibles d'usage
- 2ème Circ. Budg. 2017
- 3ème Circ. Budg. 2017 en cours
- 1ère Circ. Budg. 2018 à venir

Pilotage du programme | Chantiers transverses | Communication autour du programme

Evaluation de la création de valeur par l'usage des SI de production de soins en termes de qualité / sécurité des soins et d'amélioration des prises en charge

Accompagnement des établissements de santé à l'atteinte des indicateurs Hôpital Numérique (pré-requis et cibles d'usage sur les domaines fonctionnels prioritaires.

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1 Focus on the French approach to E-Health and EHR

Terri-santé

TSN (Territoires de Soins Nuériques), now E-Parcours : The French way to IHE (Information Health Exchange) and patient pathways digital management

The « Ile de France » region implementation of E-Parcours

The « French Touch » : KISS is not an option*

TERRI SANTÉ

Portails d'accès

Services internes

Plateforme d'interopérabilité

Services régionaux

REPSIF | Authentification | ROR | SRI | SSO

Services nationaux

MSS | DMP

Services métiers | Objets connectés | SIH | SGL | LGC

*** KISS : KEEP IT SIMPLE AND STUPID, ALBERT EINSTEIN'S DESIGN PRINCIPLE**

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1 Focus on the French approach to E-Health and EHR

The next stage : the Health Data Hub to develop Data-based and AI applications

***The health data hub*: a secure one-stop shop, organized in network with local hubs. It must become the State's instrument for putting health data "at the service of the greatest number".**

HEALTH DATA HUB

Things are moving fast (even in France)

- **Presentation of the Villani report on AI** — *March 2018*
- **Launch of the health data hub prefiguration mission**
- **Launch of the first call for projects** — *February 2019*

The health data hub call for projects *: 13 projects that meet a public interest goal*

THEMATIC
- Research
- Information for the patient
- Support for healthcare professionals
- Improving the healthcare system

Timeline
- Applications expected for 9 March
- A one-year support from the health data hub

"These will not be experimental projects, the Heath data hub must allow them to pass a stage and gain maturity but these start-ups will not start a project. The ideal would be that they could present us with first results within 6 months." - Stéphanie Combe

"If the GAFAM want to present projects and meet the criteria of the call, then why not? « - Stéphanie Combe

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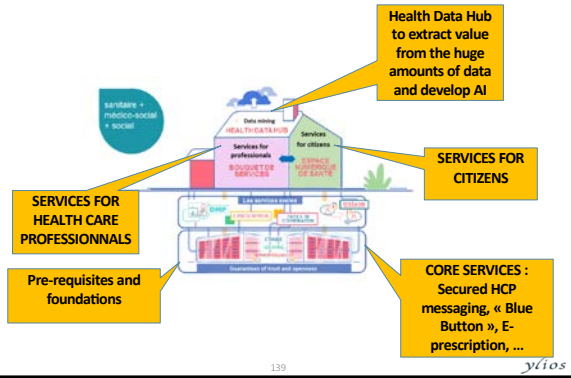
3 Focus 1 - Strategy and scope

IT IS ONLY IN 2019 THAT FRANCE BUILT A COMPREHENSIVE VISION OF ITS E-HEALTH STRATEGY



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Summary

2 Issues for Lebanon EHR strategy

It's all moving around giving a broad range of possible ambition levels

	Yesterday	Tomorrow
Scope	• Intra-hospitals	• Hospitals • **Patients** • Liberal homecare professionals • Homecare
Direct stakeholders involved	• Doctors, • Nurses, • Hospital managers	• The same : Doctor, nurses, hospital managers • Liberal homecare professionals • Patient • Home caregivers
Concepts	• EMR/EHR within one hospital • Administrative management of patient • Specialized medico-technical functions : imaging, biology	• Integrated hospital and GP/outpatient clinical path management • Patient portal at territory level : reference hospitals, local hospitals, and liberal HCP • « blue button » functionalities
Services	• Access to EMR/EHR within one hospital • Exchange of data for billing purpose with social security and private payers	• Telemedicine • Tele-expertise between HCP : liberal to hospitals, hospital to hospital • Continuous monitoring of chronic/long term condition patient
Technology	• PC, • Servers • Data connections	• Mobile access through Smartphones with ultra-high penetration rates • Broadband Connectivity • Cloud • Big Data and AI • Internet of things

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2 Issues for Lebanon EHR strategy

E-Health and HER : a strategic and change management issue more than a technical one

- **We discussed the issue of optimisation of doctor time, and the acceptance of a new organisational system with the CEO of GCS Sesan**
- **For the example of blood gas test : 3 possible scenario**
  - **Scenario 1**: the doctor tells the nurse to do a blood gas test
    - It takes **five second** to the doctor to prescribe the blood gas test
    - There is no record of this prescription, and therefore no follow up. It can be prescribed again by another doctor and the loss of time is huge.
  - **Scenario 2** : the doctor writes a note for the nurse to do the blood gas test
    - It takes 1**5 seconds** to the doctor to write the note on the patient file (doctor writing style)
    - It will take a lot of time to another doctor to know what have been done/prescribed, as he will have to look for the record and the note. The loss of time is significant.
  - **Reason 3** : the doctor uses the informatic system to prescribe the blood gas test
    - It takes **a few minutes** for the doctor to login to the system, find the right patient file, prescribe the blood gas test, and then for the nurse to validate the test.
    - Any doctor can see what has been prescribed/done, and the gain of efficiency is huge.
- **It will be a radical transformation of the practices and processes of healthcare professionals, and therefore a time of adaptation and some time investment will be necessary at first. But once it's done, the benefits in time saving and efficiency gain will be huge : when finding the records of a patient within a few minutes, not prescribing twice the same test, etc.**

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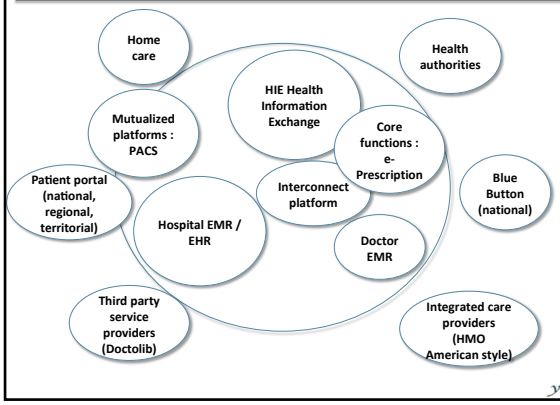
2 Issues for Lebanon EHR strategy

What is the scope?



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2 Issues for Lebanon EHR strategy

Three reasons to mutualize some functions for a platform

- **We discussed the issue of what was the value in having some functions mutualizes in a digital platform with the CEO of GCS Sesan**
- **For the example of the PACS function : 3 major reasons**
  - **Reason 1**: the unavailability of expertise within hospitals
    - PACS is a very complex function to specify, procure, implement and maintain
    - Even in large academic hospitals
    - It ended up that it was the Radiology Department that handled de procurement process
  - **Reason 2** : the necessity to continuously invest in infrastructure to cope with evolutions
    - With the increase of usage and performance expectations, the PACS needs continuous investments that generate organizational complexity if it is hosted and managed on the hospital preises
    - Outsourcing to mutualized platform allows for a smooth increase in infrastructure capacity in "cloud mode"
  - **Reason 3** : the complexity of reversibility if you want to change the supplier
    - Changing the PACS software supplier is a very complex process, that can hardly be handled by one hospital Information Systems team
    - Mutualization allows to share the process, the expertise, the human resources
- **Can also apply to biology, drug prescription, telemedicine platform, …**

The case for mutualized platforms

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2 Issues for Lebanon EHR strategy

Specific Key Success Factors : Implement Digital Business Models and approach

- **Succeeding in developing E-Health solutions and adoption necessitates to implement :**
- **Digital Business Models**
  - Platform mutualization
  - API : Application Programming Interface architecture to facilitate data and lower level applications sharing and mutualization and reducing "barriers to entry" and costs
    - Example : Uber uses Google Maps as "building block" for its ride-hailing service
  - Value is in the usage, not in the technology
  - PC, Tablet and more and more mobile access
- **Digital approach to value creation**
  - Customer / User centricity
  - Fluid and attractive user interface (UX – User Experience oriented design)
  - Creating a unique experience
  - Generate immediately perceived value : unique combination of information, helping take the most appropriate decision, unprecedented reduction of administrative hassle, saving precious time, avoiding unnecessary physical moves / appointments, …

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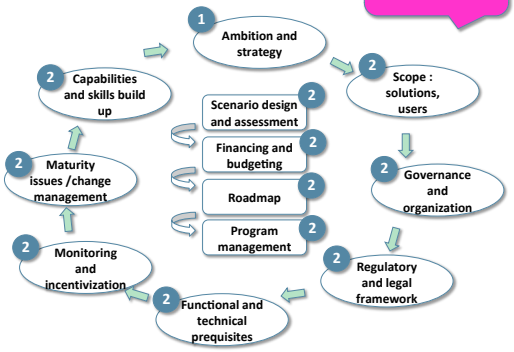
2 Issues for Lebanon EHR strategy

Proposed methodology

Every step is critical



146 ylios

2 Issues for Lebanon EHR strategy

Illustration of possible ambition and strategy formulation

The ambition pursued has to be defined :

Global positioning of Lebanon	Public Health outcomes	Efficiency of the healthcare system	Regional positioning in Healthcare
• Design and implement an E_Health ambition that is comparable to the Top Tier OECD countries	• Divide by 2 the number of people whose Diabetes is out of control • Prepare the Healthcare system to cope with growth of elderly poly-pathologic population • Measure quality of outcomes	• Develop coordinated care between hospitals and outpatient Health Care Professionnals • Reduce Average Length of Stay • Develop Home Care with distant monitoring	• Develop a leadership position in E-Health in the MENA region • Make E-Health become a source of economic development for Lebanon : IT providers, exportation pf services, Start Ups,… • Leverage Lebanese medical expertise to provide Telehealth services in N.E. / M.E.

Once ambition is defined (and assuming you can afford it), then strategy can be defined on all other aspects

147 ylios

2 Issues for Lebanon EHR strategy

Lebanon has a significant digital penetration rate

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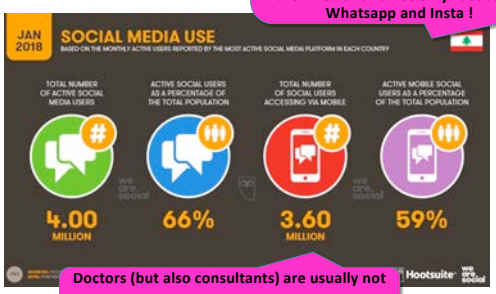
2 Issues for Lebanon EHR strategy

A significant usage of social networks

Lebanese are world class champions in the usage of social networks

Make them use their Smartphone for their health and not only Facebook, Whatsapp and Insta !



Doctors (but also consultants) are usually not change makers. So use patients and citizens to enforce change!

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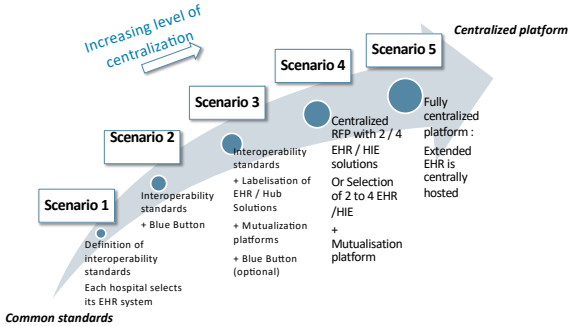
3 Focus 5 - Scenario for procurement strategies

Sourcing scenario – level of centralization



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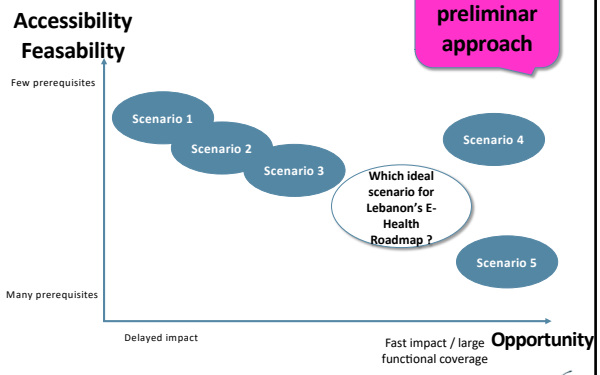
3 Focus 5- Scenario for procurement strategies

Oportunity – Feasability matrix – Preliminary approach

!! A very preliminar approach



Summary

3 Focus 1 - Strategy and scope

National Strategy e-health 2020 – the France approach

Les technologies du numérique sont porteuses de changements majeurs dans l'organisation de notre système de santé, il s'agit donc pour les Etats de structurer une stratégie autour de la e-santé.

⇨ La **Stratégie nationale e-santé 2020** en France

AXE 1

Position citizens at the center of E-Health

- Renforcer et simplifier l'accès aux soins
- Développer les services aux patients pour favoriser leur autonomie
- Outiller la démocratie sanitaire

AXE 2

Sustain digital innovation by Healthcare Professionnals

- Développer des cursus de formation des professionnels de santé autour du numérique
- Soutenir les professionnels de santé qui s'engagent en faveur de l'innovation numérique
- Accompagner le développement des systèmes d'aide à la décision médicale
- Soutenir la « co-innovation » avec les patients et les industriels

AXE 3

Simplify the framework for economic players (suppliers, start ups)

- Établir une gouvernance plus lisible et ouverte de l'e-santé
- Favoriser le partage de priorités entre acteurs publics et économiques en matière de systèmes d'information
- Clarifier les voies d'accès au marché des solutions e-santé
- Déployer un cadre d'interopérabilité facilitant l'intégration des innovations

AXE 4

Modernize regulation tools of our Healthcare System

la sécurité des systèmes d'information

- Accélérer le développement de méthodes d'évaluation adaptées aux solutions multi-technologiques
- Le numérique au service de la veille et de la surveillance sanitaire
- Lever les freins au développement du *big data* au service de la santé, dans des conditions définies avec les citoyens

3 Focus 1 - Strategy and scope

Ma santé 2022 – the France approach

Les 10 chantiers Ma Santé 2022 retenus ont été présentés lors de la réunion du 19 novembre 2018 :

1. Structuration territoriale du réseau de proximité
2. Adaptation des formations aux enjeux du système de santé
3. Gradation des soins et GHT
4. Renforcement du management hospitalier et de la reconnaissance de l'engagement professionnel
5. Régulation et soins non programmés
6. Diversification des modes d'exercice et des parcours professionnels
7. Qualité et pertinence
8. Numérique
9. Financement et tarification
10. Élaboration du projet de loi

Les travaux sur les mesures prioritaires ont été engagés immédiatement

Le projet de loi de financement de la sécurité sociale, adopté par l'Assemblée Nationale le 3 décembre 2018, prévoit de nombreux changements pour 2019

Projet de loi Agnès Buzyn rendu public le 13 février 2019

3 Focus 1- Strategy and scope

Ma santé 2022 – the 3 main thematic

I_ Décloisonner les parcours de formation et les carrières des professionnels de sante	1. Réformer les études en santé et renforcer la formation tout au long de la vie 2. Faciliter les débuts de carrière et répondre aux enjeux des territoires 3. Fluidifier les carrières entre la ville et l'hôpital pour davantage d'attractivité
II_ Créer un collectif de soins au service des patients et mieux structurer l'offre de soins dans les territoires	1. Promouvoir les projets de santé de territoire 2. Développer une offre hospitalière de proximité, ouverte sur la ville et le secteur médico-social, et renforcer la gradation des soins 3. Renforcer la stratégie et la gouvernance médicales au niveau du groupement hospitalier de territoire et accompagner les établissements volontaires pour davantage d'intégration
III_ Développer l'ambition numérique en sante	1. Innover en valorisant les données cliniques 2. Doter chaque usager d'un espace numérique de santé 3. Déployer pleinement la télémédecine et les télésoins
IV_ Mesures diverses	1. Dispositions de simplification 2. Mesures de sécurisation
V_ Ratifications et modifications d'ordonnances	-

3 Focus 1 - Strategy and scope

Ma Santé 2022 – 3 examples of reforms

- Le déploiement des communautés professionnelles territoriales de santé est encouragé par le projet de loi, **l'objectif étant fixé à 1 000 CPTS d'ici 2022.**
- Les CPTS ont pour rôle de **coordonner les professionnels d'un même territoire qui souhaitent s'organiser – à leur initiative – autour d'un projet de santé** pour répondre à des problématiques communes.

Organisation des **soins non programmés** | Coordination **ville-hôpital** | **Attractivité médicale** du territoire | Coopération entre médecins et infirmiers pour **le maintien à domicile**

La loi propose un **modèle organisationnel** dédié aux hôpitaux de proximité autour des missions qu'ils exerceront et proposer une adaptation de leur **modèle de financement.** Les hôpitaux de proximité seront recentrés sur ce qu'on appelle les "soins de proximité" :

- Les soins courants de **médecine générale**
- La **gériatrie**
- Les **soins de suite et de réadaptation**

La Loi souhaite mettre en place les conditions nécessaires au **déploiement de 4 000 assistants médicaux pour seconder les praticiens libéraux, et** redonner du temps aux médecins, pour **le consacrer à des tâches à « valeur médicale ajoutée ».**

- **Pré-consultation** (installer, peser, mesurer, ...)
- **Accueil**
- **Secrétariat**

3 Focus 1 - Strategy and scope

Ma Santé 2022 – L'Espace numérique de santé (Digital platform for patient care)

Contexte et objectifs de l'article

Le projet de loi prévoit que chaque usager du système de santé se verra offrir dès la naissance **un espace numérique de santé sécurisé** et **personnalisé**. Il sera lancé à une date fixée par décret, antérieure au **1er janvier 2022**.

trois objectifs sur le long terme

- Faire de l'usager, malade ou non, un **acteur de son parcours de santé**, en lui permettant de gérer ses données de santé et services
- **Accroître la confiance** dans les services numériques de santé, et **stimuler l'innovation** et l'intérêt des acteurs privés
- Garantir la possibilité pour chaque Français d'avoir un **médecin traitant** et **l'accès à un médecin en proximité** dans la journée en cas de nécessité.

Exemples de fonctionnalités d'un espace numérique de santé

- Disposer d'informations sur la **qualité des prises en charge** autour de lui ou p**rendre rendez-vous en ligne avec tous les professionnels de santé** (ville et hôpital)
- Disposer de l'ensemble de ses **prescriptions dématérialisées et échanger de façon sécurisée** avec son équipe de soins
- Trouver des **informations et conseils personnalisés** pour sa santé

Cas d'usage

Jules, 23 ans, *pourra choisir, suite à son déménagement* ***un nouveau médecin*** *et celui-ci* ***aura accès à tout son historique médical*** *grâce à l'espace numérique. Ce médecin gagne du temps et de l'assurance par rapport au diagnostic*

Maria, 50 ans, *peut* ***préparer son dossier administratif*** *et* ***recevoir toutes les consignes*** *pour se préparer à son séjour à l'hôpital. Suite à ce séjour, elle et son médecin traitant auront* ***accès à son compte rendu d'hospitalisation***.

Noémie, 17 ans, *a accès, sur son espace privatif, à des* ***informations qui la concernent directement*** *comme (sommeil, sexualité,, sport, dangers liés à l'alcool ou au tabagisme,...).*

157 ylios

3 Focus 1 - Strategy and scope

Ma Santé 2022 – The digital basis

MA SANTÉ 2022 UN ENGAGEMENT COLLECTIF

DOSSIER D'INFORMATION

Feuille de route
« Accélérer le virage numérique »

158 ylios

3 Focus 1 - Strategy and scope

The Danish Healthcare system

The Danish Healthcare System

Basic Features

- Universal Coverage
- Free & Equal Access
- Financed by general taxes
- A high degree of decentralization

National Level — Ministry of Health

Regional Level — 5 Regions

Local Level — 98 Municipalities

159 ylios

3 Focus 1- Strategy and scope

The Danish Healthcare system

16 new hospitals will be the backbone of patient centric healthcare

- Public-private partnerships
- New innovations
- Danish design
- Green technology

160 ylios

3 Focus 1- Strategy and scope

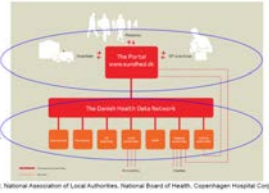
The Danish Healthcare system

A long term focus on health data networks and on e-health provide efficient access to healthcare information

Healthcare DENMARK

Sundhed.dk
E-health Portal
2003 -

MedCom
Health Data Network
1994 -



Who is behind?
Ministry of Health, Danish Regions, Ministry of Interior, National Association of Local Authorities, National Board of Health, Copenhagen Hospital Corporation, Danish Pharmaceutical Association

161 ylios

3 Focus 1 - Strategy and scope

The Danish Healthcare system

The Shared Medication Record

Description

- One national database containing updated information about prescription medicine for all patients in Denmark
- Access for all doctors, nurses, dentists, pharmacists at hospitals
- Viewing access for citizens (own data)

Background

- Reducing number of medication errors
- Better communication regarding medicine between all involved parties
- Improving the quality of the treatment

162 ylios

3 Focus 1 - Strategy and scope
The Danish Healthcare system

Telehealth

Telemedical ulcer assessment: The method
- The nurse photographs the ulcer with her cell phone and mails the image to the doctor.
- The doctor prescribes new treatment or new medication.
- Communication between nurse and doctor is based on a shared web based patient record.

The benefits:
- reduce the number of hospital admissions
- minimise the patients' transport time
- reduce doctor and nurse time at the hospitals
- improve the skills of the municipal nurses increase patient satisfaction.

National roll-out: 70 % of all relevant patients to be included by 2017

3 Focus 1 - Strategy and scope
The Danish Healthcare system

Personalised Healthcare – and Telehealth

TeleCare Nord

- All COPD patients in Region North
- Highest number of research projects
- Evidence
- OpenTelehealth – open source platform

The EPITAL project

- Personalised Healthcare
- Call center and new support organisation
- Patient Empowerment

3 Focus 2 - Functional and technical architecture
The Danish Systematic eHealth platform

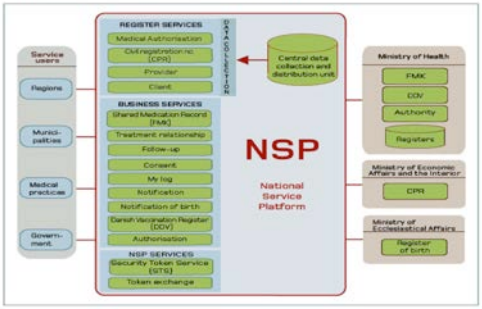
Data for the National E-health platform is delivered by the regional E-health solutions – e.g. the Systematic eHealth platform

Columna is a full blown eHealth platform consisting of
- The Patient Record
- Patient Administration (ADT)
- Booking
- Order/Result
- Medication Management
- Logistics

SYSTEMATIC

3 Focus 2 - Functional and technical architecture
The Danish Systematic eHealth platform

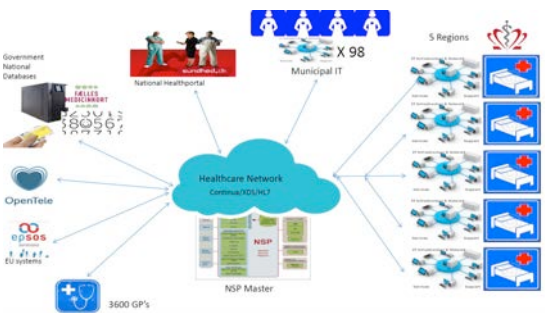
The National Service Platform



3 Focus 2 - Functional and technical architecture
The Danish Systematic eHealth platform

The National Service Platform – and new services

3 Focus 2 - Functional and technical architecture
The Danish Systematic eHealth platform



3 Focus 3- Steering, KPI and incentive policy
The French policy of incentive funding

DIRECTION GÉNÉRALE DE L'OFFRE DE SOINS

HÔPITAL NUMÉRIQUE : VOLET FINANCEMENT 2013-2017

Depuis le lancement du volet financement, les financements délégués s'élèvent à ce stade à **307 millions d'euros**.

on constate une **consommation de l'enveloppe de près de 77 %** de l'enveloppe globale (307 millions sur 400 millions).

	2013	2014	2015	2016*	2017	Total
Amorçage (k€)	5 089	20 461	32 874	5 155	14 426	78 005
Soutien à l'usage (k€)	4 719	30 881	59 905	75 960	57 400	228 865
Total (K€)	9 808	51 342	92 779	81 115	71 826	306 870

* L'amorçage C2 et C3 2016 a été délégué en C1 2017 (14 426 k€)

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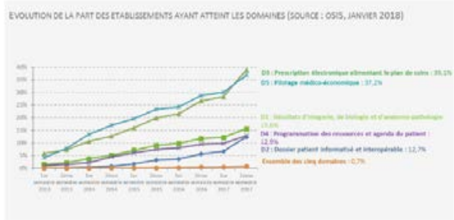
3 Focus 3 - Steering, KPI and incentive policy
The French policy of incentive funding



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3 Focus 3 - Steering, KPI and incentive policy
The French policy of incentive funding

AXE 4 : FINANCEMENT DES ÉTABLISSEMENTS
UN FINANCEMENT DU SOCLE DE PRIORITÉS, SUBORDONNÉ À L'ATTEINTE DES CIBLES D'USAGE

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3 Focus 3 - Steering, KPI and incentive policy
The French policy of incentive funding

Financement - Principales actions 2012 -2017

1 239

880

Dont 46%

Dont 39%

Dont 15%

5 domaines ciblés

95% de l'enveloppe consommée à janvier 2018

- **Deux instructions** sur le volet financement (2013 et 2016)
- **Mise à disposition d'un outil de gestion des dossiers et de documentation** : grille de contrôle, guide des indicateurs, FAQ actualisée

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3 Focus 3 - Steering, KPI and incentive policy
The French policy of incentive funding

Le regard des acteurs

Des modalités de financement innovantes

Pour l'ensemble des acteurs, la mise en place de prérequis a permis d'améliorer nettement le niveau de maturité des établissements.

L'ensemble des acteurs s'accorde sur le fait que le **mode de financement à l'usage, conditionné à l'atteinte des objectifs, a été très motivant pour les établissements.**

74% des établissements financés pensent que le financement à l'usage a permis de faire accélérer les projets et 54% estiment qu'il a été un vecteur efficace pour mobiliser et faire communiquer les acteurs

Les acteurs recommandent d'augmenter le taux de financement à l'amorçage (aujourd'hui limité à 20%) afin de ne pas **ralentir certains établissements** qui ont pu être mis en difficultés pour avancer les frais.

Des financements pour l'ensemble des établissements

Au total, plus d'un quart des référencés dans oSIS ont bénéficié d'un financement Hôpital Numérique. La part des financements a bénéficié en priorité aux établissements publics (47 %) et privés (40%).

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3 Focus 3 - Steering, KPI and incentive policy
The French policy of incentive funding

Une priorisation des domaines D2 et D3

L'analyse des financements démontre que les domaines D2 et D3 sont les deux principaux domaines financés du programme et recouvre 56% de l'enveloppe de financement délégué.

	Part de l'enveloppe de financement	Part des dossiers financés	Montant du financement délégué en milliers d'euros
D1	13%	12%	50 354
D2	30%	26%	112 028
D3	33%	30%	126 898
D4	9%	12%	35 083
D5	15%	20%	55 074

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3 Focus 4 - Change management and capabilities/skills build up

Maturity issues, Change Management and capabilities build up examples for Lebanon

- **Providing Change management to help adapt doctors and other HCPs practice**
- Developing the Information Systems and IT Skills
- Example (following slides) : The Hopital Numerique program

3 Focus 4 - Change management and capabilities/skills build up

The French illustration for change management

CHANTIER 3. ACCOMPAGNEMENT DES ÉTABLISSEMENTS DE SANTÉ À L'ATTEINTE DES PRÉREQUIS ET DU SOCLE FONCTIONNEL

Depuis la publication en novembre 2011 du guide des indicateurs des prérequis et des domaines fonctionnels prioritaires, l'ensemble des établissements de santé ont été invités à atteindre ce premier palier de maturité.

Pour les accompagner dans cette démarche, l'équipe projet Hôpital Numérique leur a proposé un soutien méthodologique et opérationnel reconnaissant différents outils.

Pour l'atteinte des prérequis du programme, une boîte à outils publiée par voie d'instruction[14] et composée :

- D'un **outil d'auto diagnostic** et d'un plan d'actions associé, permettant aux structures qui le souhaitent de procéder à une auto-évaluation de leur situation au regard des 3 prérequis du programme et d'identifier sur cette base la démarche et les actions à mettre en œuvre pour atteindre l'ensemble des indicateurs de prérequis ;
- De **fiches pratiques** sur des thématiques spécifiques en lien avec les indicateurs de prérequis (procédure type de mise à jour d'un référentiel unique de structure, plan type d'un Plan de Reprise d'Activité et bonnes pratiques, ...).

13 ARS déclarent avoir mis en place un dispositif d'accompagnement à l'atteinte des prérequis.

Ce dispositif concernait environ 485 établissements en 2013.

Synthèse de l'enquête auprès des cibles des ARS – 2013 (21 répondants)

Pour l'atteinte des cibles du programme sur les domaines fonctionnels prioritaires, un dispositif d'accompagnement porté par l'ANAP et reposant notamment sur la constitution et l'animation :

- D'un **cercle d'experts des SIH** permettant de construire de la connaissance et des productions adaptées aux besoins et difficultés rencontrés et remontés par les établissements de santé dans le déploiement de leurs SIH et la généralisation de leurs usages ;
- D'un **réseau d'ambassadeurs régionaux** (tous professionnels en établissement) en charge de relayer les productions des experts vers les établissements et d'apporter une assistance de proximité (aide à la mise en œuvre des productions des experts dans le contexte spécifique de l'établissement, ...), **dans une logique de « compagnonnage » par des pairs ;**
- D'une **plateforme Internet de partage et d'échange** (« Mon Hôpital Numérique ») pour coordonner l'ensemble, capitaliser et mettre en partage les productions existantes[15]. 2 063 comptes ont ainsi été créés tous de 1 276 établissements de santé ;
- Sur l'ensemble des indicateurs (prérequis et cibles) ainsi que sur la boîte à outils, des **Foires aux Questions (FAQ)**, qui apportent des réponses aux interrogations les plus fréquentes des établissements de santé.

3 Focus 4 - Change management and capabilities/skills build up

The French illustration for capabilities/skills build up

- De **modules de formation** ayant permis de former 140 professionnels de santé (ayant bénéficié en moyenne de 4 sessions de formation)

Ce sont ainsi **63 documents** qui ont été produits par les professionnels, **15 experts du numérique** en santé et **100 ambassadeurs** qui ont été collectés et **910 professionnels** qui ont intégré la communauté de pratiques (124 discussions, 11 groupes d'entraide, 208 contributeurs). **8 journées nationales, cumulant plus de 3 000 participants** ont également été organisées.

Le regard des acteurs

Un **réel programme d'accompagnement au changement** a été déployé auprès des établissements pour les aider à gagner en maturité, notamment dans un contexte no forte disparité : les acteurs s'accordent sur le fait que de nombreux outils, reconnus de qualité, ont été mis à disposition par la DGOS (guide des indicateurs…), l'ANAP (réseau des ambassadeurs, boîte à outils…), l'ASIP et le rôle prépondérant des ARS dans l'accompagnement.

72% des établissements financés déclarent avoir utilisé le guide des indicateurs mis à disposition par la DGOS et 63% ont utilisé la boîte à outils

Enquête sur l'accompagnement des établissements de santé, 2014

Axes d'amélioration

La nécessité d'**orientations nationales relatives à l'accompagnement à l'atteinte des prérequis** et au renseignement des dossiers est soulignée afin de garantir une harmonisation de l'accompagnement sur le territoire.

Sur ce sujet, les acteurs soulignent notamment parfois une **surinterprétation du niveau des prérequis** et des difficultés de compréhension des attentes (sur les établissements financés, **82% déclarent avoir eu des difficultés à comprendre et à calculer les indicateurs et 75% avoir rencontré des difficultés dans le remplissage** de leurs dossiers), points nécessitant un accompagnement de proximité renforcé.

3 Focus 5 - Scenario for procurement strategies

Basing the offer on the demand

AXE 3 : OFFRE

STIMULER ET STRUCTURER L'OFFRE DE SOLUTIONS

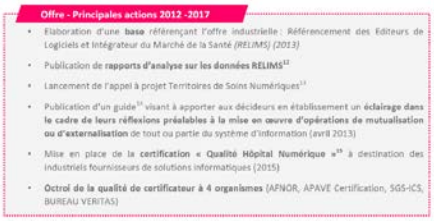
Après analyse, l'offre actuelle de solutions s'est révélée peu adéquate au regard de critères structurants (interopérabilité, couverture fonctionnelle, aide à l'intégration, pérennité des produits et des acteurs, …) dans ce contexte, le 2ème axe stratégique du programme a eu pour objectif de permettre **d'accroître la qualité de l'offre industrielle et de favoriser une meilleure adéquation offre-demande** (via une évolution de la structuration du marché des fournisseurs), mais également de promouvoir l'innovation numérique au service d'une modernisation de l'offre de soins (au sein des établissements de santé mais aussi hors de l'hôpital) pour permettre l'émergence de parcours cohérents et coordonnés à l'échelle d'un territoire.

Dans la poursuite de cet objectif, le 2ème axe stratégique s'est notamment appuyé sur :

- Le **référencement des éditeurs de logiciels et intégrateurs** du marché de la santé, dans le but de disposer d'une meilleure connaissance de l'environnement le des établissements de santé, c'est-à-dire d'une cartographie des logiciels mis à jour en temps réel et d'informations fiables et actualisées (coordonnées, présentation…) et afin de permettre aux établissements de disposer d'un catalogue de solutions ;
- La **mise en place d'une démarche d'homologation** des solutions informatiques hospitalières conformes aux standards et garantissant en particulier la compatibilité des solutions proposées au cadre d'interopérabilité et dont le système de management de la qualité respecte le référentiel Hôpital Numérique (normes ISO 9001 ou ISO 13485 et exigences complémentaires[16]). Cette démarche d'homologation vise notamment à améliorer la qualité de l'offre industrielle et à fournir aux acteurs une garantie sur le management de la production ;
  Les premiers retenus ont été : une application fondée au périmètre hospitalier (c'est-à-dire au périmètre fonctionnel du programme Hôpital Numérique et aux SIH), une démarche de labellisation basée sur l'engagement volontaire des industriels sur le respect d'un référentiel fonctionnel et technique dans un premier temps.
  La certification est délivrée par les organismes certificateurs accrédités par le COFRAC ou un autre organisme d'accréditation selon la norme NF EN ISO / CEI 2017 et signataires d'une convention avec l'ASIP Santé[17]. Ils sont au nombre de 4 : AFNOR, APAVE Certification, SGS-ICS et Bureau Veritas.
- L'**accompagnement des établissements de santé dans leurs démarches** de mutualisation et/ou d'externalisation de leurs systèmes d'information.
  Cette action a visé à **fournir un éclairage aux établissements** afin d'accroître la compréhension générale des décideurs sur les concepts clés, le cadre général de mise en œuvre de ce type d'opérations et les opportunités, risques et leviers associés, et ce afin de faciliter leur prise de décision.

3 Focus 5 - Scenario for procurement strategies

Basing the scenario on the offer



Offre - Principales actions 2012 -2017

- Elaboration d'une **base** référençant l'offre industrielle : Référencement des Editeurs de Logiciels et Intégrateur du Marché de la Santé *(RELIMSI) (2013)*
- Publication de **rapports d'analyse sur les données RELIMS**[12]
- Lancement de l'appel à projet Territoires de Soins Numériques[13]
- Publication d'un guide[14] visant à apporter aux décideurs en établissement un **éclairage dans le cadre de leurs réflexions préalables à la mise en œuvre d'opérations de mutualisation ou d'externalisation** de tout ou partie du système d'information (avril 2013)
- Mise en place de la **certification « Qualité Hôpital Numérique »**[15] à destination des industriels fournisseurs de solutions informatiques (2015)
- **Octroi de la qualité de certificateur à 4 organismes** (AFNOR, APAVE Certification, SGS-ICS, BUREAU VERITAS)

3 Focus 5 - Scenario for procurement strategies

The specificities of the regions is to be considered in the scenario choice

Governorate	Arabic name	Capital City	ISO code	Area (km²)	Population
Akkar	عكار	Halba	LB-AK	788	389,899
Baalbek-Hermel	بعلبك - الهرمل	Baalbek	LB-BH	3,009	416,427
Beirut	بيروت	Beirut	LB-BA	19	432,645
Beqaa	البقاع	Zahleh	LB-BI	4,429	536,768
Mount Lebanon	جبل لبنان	Baabda	LB-JL	1,968	1,831,533
Nabatieh	النبطية	Nabative	LB-NA	1,098	368,077
North	الشمال	Tripoli	LB-AS	1,236	782,436
South	الجنوب	Sidon	LB-JA	930	578,195

Lebanon is divided into eight governorates (*muhafazah*). Each governorate is headed by a governor (*muhafiz*):
All of the governorates except for Beirut and Akkar are divided into districts and then subdivided into municipalities.
Implementation of the two newest governorates, Akkar and Baalbek-Hermel, remains ongoing since their establishment in 2014.[1]
In August 2017, the Lebanese parliament decided to make a new governorate comprising the districts of Jbeil and Keserwan. At the time, the governorate was awaiting presidential approval and actual implementation.[2]

3 Focus 6 - Governance

Organisation of governance in France

- **ORGANISATION OF GOUVERNANCE**

Main National agencies

HAS – HAUTE AUTORITÉ DE SANTÉ – High autority for health

asipsanté – AGENCE DES SYSTÈMES D'INFORMATION PARTAGÉS DE SANTÉ – The French Agency for Digital Health

DGOS – General direction for the offer of care

Delegation to the Health Information Systems Strategy

ANAP – appui santé & médico-social – National Agency for Performance Support

Main Regional agencies

ars – Agence Régionale de Santé – Regional health agency

Main healthcare actors

GHT – GROUPEMENT HOSPITALIER DE TERRITOIRE – Hospital group of a territory

ylios

3 Focus 6 - Governance

Organisation of governance in France

Organisation of gouvernance in application to the Digital Hospital Plan

La **DGOS (Direction Générale de l'Offre de Soins)** du ministère des solidarités et de la santé est responsable de l'élaboration et de la mise en œuvre de l'ensemble du programme Hôpital Numérique (axes stratégiques et chantiers transverses).

Les **ARS (Agences régionales de santé),** interlocutrices privilégiées des établissements de santé dans leurs démarches, ont été au cœur du dispositif opérationnel et ont décliné le programme Hôpital Numérique en région.

Les **établissements de santé** sont les **bénéficiaires du programme** et les principaux acteurs de son succès sur le terrain.
Par leur implication dans la mise en œuvre du plan d'actions Hôpital Numérique, ils ont contribué au développement et à la modernisation des systèmes d'information hospitaliers au service des professionnels de santé.

L'ASIP Santé (Agence des systèmes d'information partagés en santé) a contribué aux travaux d'élaboration de la démarche d'homologation des solutions logicielles ainsi qu'à ceux relatifs à la mutualisation et à l'externalisation des SI.

L'ANAP (Agence nationale d'appui à la performance des établissements de santé et médico-sociaux) a contribué aux travaux relatifs aux compétences SI (Axe 2) et à la mutualisation et à l'externalisation des SI (Axe 3).
Par ailleurs, elle a mis en place un dispositif d'accompagnement des établissements à l'atteinte des cibles d'usages sur les domaines fonctionnels prioritaires (chantier transverse 4).

La HAS (Haute Autorité de Santé) a participé à l'atteinte des objectifs du programme en intégrant la problématique de la maturité des SIH dans la certification des établissements de santé.

ylios

Summary

3 ANNEX

Presentation of Ylios

Nos interventions combinent généralement des savoir-faire analytiques et rationnels (le « hard ») et des compétences centrées sur l'humain et l'intelligence collective (le « soft »).

Notre différenciation s'appuie sur trois piliers :

- **Le positionnement sur les « Terra Incognita »,** l'anticipation du futur et la capacité à adresser des sujets qui interpellent nos clients dans un champ très large
- **Le développement pérenne et l'excellence professionnelle** à travers l'innovation méthodologique et l'intégration de compétences pluridisciplinaires internes et externes
- **La logique de coopération et de solidarité** entre associés et avec les consultants, qui s'inscrit dans un projet à forte dimension humaine

L'équilibre entre les différentes pratiques de conseil, entre stratégie et transformation, entre approches "hard" et "soft", doublé de la qualité de nos équipes et de leur sens du client, nous permettent de répondre aux problématiques complexes que nos clients rencontrent

Ylios s'appuie sur un capital humain de qualité composé de :

- **10 profils très seniors (Associés, Principaux)** avec près de 20 ans d'expérience dans le conseil et **plus de vingt cinq consultants**
- Des **partenariats stratégiques** qui apportent des compétences d'expertise et des capacités d'intervention à grande échelle ainsi qu'à l'international
- Un **réseau d'experts et d'universitaires** indépendants

ylios

3 ANNEX

Presentation of Ylios

Une connaissance fine de l'écosystème et un **principe de transversalité** dans nos approches et interventions

ylios

3 ANNEX

La prospective en santé peut être abordée à travers 6 thématiques

Présentation des différentes thématiques prospectives

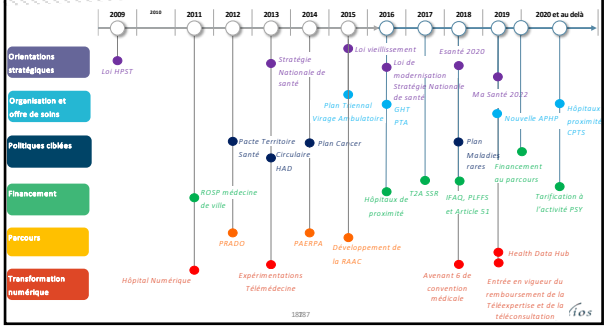
Suggested **Pre-requisites** for eHealth and EHR **success**

- Regulation & Coordination
- Legislation
  - Electronic Transactions legislation
  - Electronic signature
  - Software and data licensing
  - Privacy and security and compliance with HIPAA & GDPR
- Standards for data storage and interoperability
- Database
  - Databases and codes for professionals, hospitals, insurers, citizens, etc..
  - Unique Object Identifiers (OID)
  - Unique national health services users identifier
- Infrastructure
  - Central or distributed servers
  - Fiberoptic lines
  - Interface systems
- Human resources capacity building
  - Health workers IT skills
  - Citizens IT skills
  - IT workers advanced skills
- Non human resources
  - Funding
  - Modes of operations

ylios

3 Focus on the French approach to E-Health and EHR
Timeline

Ces dix dernières années, le système de santé a connu de profondes mutations qui sont venues impacter en profondeur l'organisation et le financement des soins en France.



3 Focus on the French approach to E-Health and EHR
Politiques publiques et e-santé en France : les leviers favorisant le développement de l'e-santé

Un *benchmark* de l'avancement de 11 pays – très hétérogènes – dans le domaine de la e-santé a été mené dans le cadre de l'étude prospective e-santé commanditée par le PIPAME.

Les conclusions de l'étude mettent en avant que leur **capacité à combiner de façon cohérente les 9 leviers** présentés ci-dessous **est déterminante dans le développement de l'e-santé** au bénéfice de sa population et de ses professionnels de santé

Source : Etude PIPAME (pôle interministériel de prospective et d'anticipation des mutations économiques) e-santé, Février 2016

3 Focus on the French approach to E-Health and EHR
Focus on the French program Hôpital Numérique (digital hospital) - Overview

The digital Hospital program, a strategic plan for the development and modernization of SIH on the period 2012-2017. It has been piloted by the Directorate General of the supply of health (DGOS) in order to prepare the steps for the development of HSO for better patient care.

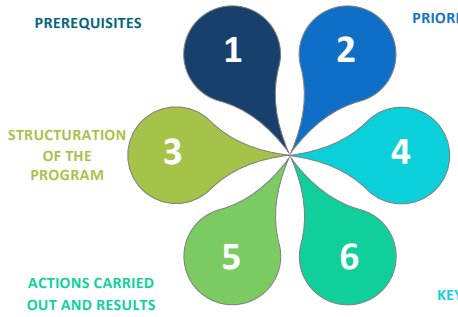
Trois caractéristiques du programme…

- Un programme bien structuré qui doit être poursuivi pour permettre l'atteinte d'un socle numérique commun
- Un programme national incluant l'ensemble des acteurs, qui doit renforcer la cohérence des actions
- Un programme innovant et transparent qui doit fiabiliser ses outils et communiquer davantage

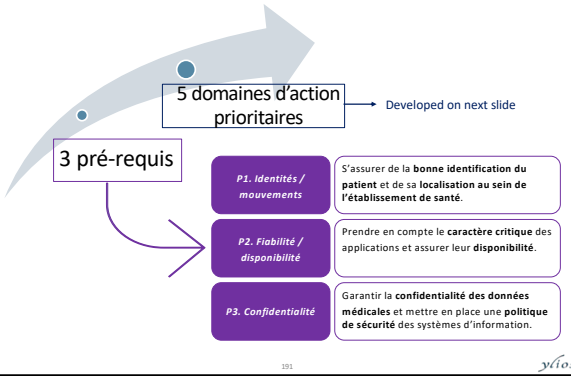
Poursuivant trois ambitions :

- Coordonner l'ensemble des acteurs (établissements de santé, ARS, administration centrale, industriels) autour d'une feuille de route commune pour les SIH ;
- Soutenir les projets innovants ;
- Amener le système d'information de l'ensemble des établissements de santé au palier de maturité Hôpital Numérique, caractérisé par :
  - Des prérequis indispensables pour assurer une prise en charge du patient en toute sécurité ;
  - Cinq domaines fonctionnels prioritaires pour lesquels le programme définit des exigences d'usage du SI.

3 Focus on the French approach to E-Health and EHR
Focus on the French program Hôpital Numérique (digital hospital) - Summary



3 Focus on the French approach to E-Health and EHR
Focus on the French program Hôpital Numérique (digital hospital) – Prerequisites



3 Focus on the French approach to E-Health and EHR
Focus on the French program Hôpital Numérique (digital hospital) – Priority functional areas

D1. Résultats d'imagerie, de biologie et d'anatomo-pathologie	Disposer de comptes-rendus (imagerie, anapath, biologie) et d'images illustratives d'examens (scanner, IRM) accessibles directement dans les services de soins et médico-techniques
D2. DPII et communication extérieure	S'assurer que le dossier patient est capable de partager l'information via le DMP, contient un socle de données minimum et qu'une démarche de communication des documents vers l'extérieur est mise en œuvre
D3. Prescription électronique	S'assurer de l'usage des prescriptions électroniques de médicaments, d'examens de biologie, d'examens complémentaires et d'actes infirmiers, et de l'alimentation du plan de soins
D4. Programmation des ressources et agenda du patient	Disposer d'un planning du patient consolidé intégrant les consultations externes, les examens des plateaux techniques et les actes chirurgicaux et paramédicaux
D5. Pilotage médico-économique	Démontrer que l'établissement produit un tableau de bord par pôle ou entité corrélant des indicateurs sur l'activité, la performance financière, les ressources humaines et la qualité et attester de son utilisation effective.

3 Focus on the French approach to E-Health and EHR

Focus on the French program Hôpital Numérique (digital hospital) – Structuration of the program

- **The program is structured in 4 axes, and 4 transversale projects**

Axe 1 : Gouvernance
Combler les manques de gouvernance SI et favoriser l'implication dans les SI des professionnels de santé et cadre dirigeants

Axe 2 : Compétences
Renforcer les compétences relatives aux SIH

Axe 3 : Offre
Stimuler et structurer l'offre de solutions

Axe 4 : Financement
Financer un socle de priorités subordonné à l'atteinte de cibles d'usage

Chantiers transverses :

- Pilotage du programme
- Évaluation de la création de valeur par l'usage des SI de production de soins en termes de qualité / sécurité des soins et d'amélioration des prises en charge
- Accompagnement des établissements de santé à l'atteinte des indicateurs Hôpitaux Numérique (pré-requis et cibles d'usage sur les domaines fonctionnels prioritaires
- Communication autour du programme

2 Issues for Lebanon EHR strategy

Prerequisites for eHealth and EHR success

- **PROPOSITION DE STRUCTURE 1**

Technology :
- Infrastructure (haut débit disponible) → peut fonctionner dans certains établissements bien équipés
- Homogénéité sur la manière de fonctionner
- Problématiques de volumétrie de données et de leur gestion
- Outils d'interopérabilité adéquats

Acceptance of the project :
- Prise en compte de la vision patient
- Volonté des hôpitaux de s'impliquer (donc financement incitatif)
- Mise en concurrence des acteurs pour ne pas avoir les poings liés par la suite

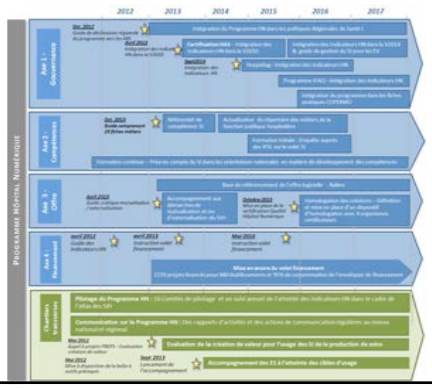
Planification :
- Budget nécessaire et suffisant
- Procédure progressive

- **PROPOSITION DE STRUCTURE 2 (basée sur celles du TSN)**

P1. Identités / mouvements	S'assurer de la **bonne identification du patient** et de sa **localisation au sein de l'établissement de santé**.
P2. Fiabilité / disponibilité	Prendre en compte le **caractère critique** des applications et assurer leur **disponibilité**.
P3. Confidentialité	Garantir la **confidentialité des données médicales** et mettre en place une **politique de sécurité** des systèmes d'information.

3 Focus on the French approach to E-Health and EHR

Focus on the program Hôpital Numérique (digital hospital) – Roadmap



3 Focus on the French approach to E-Health and EHR

Focus on the program Hôpital Numérique (digital hospital) – Actions carried out and results

3 Focus on the French approach to E-Health and EHR

Focus on the program Hôpital Numérique (digital hospital) – Key Learnings

Il est à noter que l'analyse démontre que **les prérequis ont bien joué un rôle de levier dans la maturité du socle numérique** des établissements sans toutefois constituer de barrières à l'entrée du programme, la grande majorité des établissements soulignant que ces cibles étaient déjà atteintes avant leur candidature mais pas toujours formalisées.

- Ce qui a fonctionné : mécanisme incitatif et autres leviers
- Ce qui a moins bien fonctionné : le regard des acteurs

3 ANNEXE

Example of HIE (health information exchange)

https://orionhealth.com/us/solutions/healthcare-providers/
https://orionhealth.com/us/products/coordinate/care-pathways/
https://hub.orionhealth.com/us-knowledge-hub/the-changing-priorities-of-hies

https://hub.orionhealth.com/us-knowledge-hub/the-changing-priorities-of-hies

3 Focus on the French approach to E-Health and EHR
Focus on the TSN (Numerical Care Territory)

Objectif du territoire de soins numériques : améliorer le parcours de soin du patient en améliorant la coordination des professionnels de santé d'un territoire.

il est encore à l'état de projet pilote en 5 territoires : Landes (offre médico-sociale personnes âgées), Réunion (diabète) , Essonne (partage de données entre professionnels), région Rhone-Alpes avec le projet Pascaline (Parcours de soins Coordonné et d'Accés à L'Innovation NumériquE).

- Source : 5ème forum des pratiques professionnelles en MPR organisé par la FEDMER et l'EMPR

3 Issues for Lebanon EHR strategy
Why an Health Information Exchange ? Learnings from an American study

What are the Key Business Drivers?

Over the years, different market and policy drivers have helped propel health information exchange. In 2019, **respondents' top business drivers were managing risk and delivery on value-based contracts (58%), easier integration through APIs (47%), and providing clear value to end users (47%)** (Figure 4).

Top Business Drivers

Business Drivers	% of respondents	# of respondents
Desire of stakeholders to manage risk and deliver on value-based care contracts	58%	31
Easier integration through APIs, FHIR, etc.	47%	25
Provide clear value to end users such as care transition management and medication reconciliation	47%	25
Incentives from government agencies including CMS, state, and local authorities	34%	18
Increased demand for population health analytics tools	32%	17

Figure 4. HIEs were asked to select up to three of their biggest business drivers in the adoption of technology

3 Issues for Lebanon EHR strategy
The 4 scenario considered

While all priorities listed in Figure 5 are important, it is important to note that respondents were asked to select three top priorities. Though some options were selected less frequently, that does not mean it should be interpreted that they are not considered a priority by HIEs.

Priorities in Next Two Years

Priorities	% of respondents	# of respondents
Enhance interoperability	47%	25
Support value-based care	43%	23
Integrate EHR and HIE workflows	40%	21
Integrate non-traditional types of data like genomics and social	34%	18
Enhance care coordination	34%	18
Long term sustainability, financial viability	32%	17
Participate in multi-state HIE	26%	14
Improve patient care at participant organizations	23%	12
Integrate clinical and claims data	19%	10
Manage the opioid crisis	17%	9
Identify and engage high-risk patients/members	15%	8
Improve care in the Emergency Department	8%	4
Use machine learning/artificial intelligence for precision medicine	8%	4
Enhance privacy / security / safety	6%	3
Enable telehealth	4%	2

Figure 5. HIEs were asked, "Select your top priorities for the next two years. Choose up to three (3)."

Jordan Healthcare Digital Transformation… How we did it?

Ghassan Lahham

June 15, 2019

EHR READINESS

BUILDING CONSENSUS ON THE READINESS FOR EHR IN LEBANON

EHSI

Electronic Health Solutions International

شركة الحوسبة الصحية الدولية

Mr. Ghassan Lahham

Founder and CEO of Electronic Health Solutions International (EHSI), Jordan
Email: ghassan@ehs-int.com

Mr. Al-Lahham is a well-known expert in the use of automation in the public education and healthcare sectors. He has been recognized for his entrepreneurial accomplishments in achieving significant milestones in his career. His main asset is combining the experience of a private sector entrepreneur, with his leadership of automation in world-class education and healthcare. He presents balanced and pragmatic perspectives from both the private and public sectors. Ghassan has been directly managing a number of projects that have rapid and long-term impact on the development of healthcare and education sectors in Jordan and the local region. In addition, he managed Jordan's biggest and most strategic IT project "Hakeem", which is responsible for the automation of the healthcare sector covering all public, military, and cancer centers countrywide

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Where HEALTHCARE Meets TECHNOLOGY

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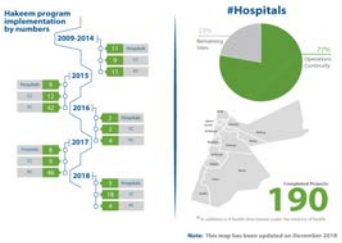
Jordan Healthcare Digital Transformation… How we did it?

Challenges Facing the Health Sector

The dream

- Electronic medical record for each citizen
- Physician flexibility to help patients from any location
- Digital data to enhance public health
- Analytics based on big data
- High quality affordable diagnosis and treatments

Dream Realization



- Success record in 190 sites.
- Above 6,5 Million Registered Patients

Laying the foundation ….

- Political buy-in
- Standardization of coding
- Solid infrastructure
- Choosing the best fit solution
- Execute…Execute…Execute…

Electronic Health Solutions International (EHSI)

EHSI is a health care IT company that focuses on the Middle East healthcare market. Headquartered in Amman and dedicated to helping healthcare organizations improve the quality of healthcare; through the use of highly effective technologies.

Our Initiatives

Why EHSI?

- Open source technology
- A blend of local and international experts combining the international standards and local awareness
- A specialized team of over 450 experts
- A 24/7 service center for the region.

Hakeem Program

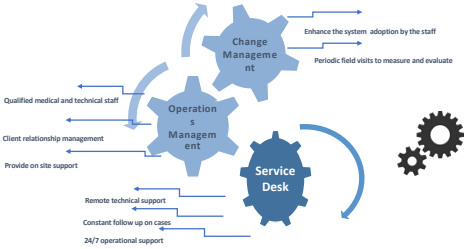
Launched in 2009, under the patronage of His Majesty King Abdullah II.

Hakeem program represents the first initiative of the company for computerizing the Kingdom's health sector.

Hakeem program aims to deploy EHR in Jordan's health sector civil and military hospitals and clinics.

Hakeem Program in four easy steps

Business continuity and support



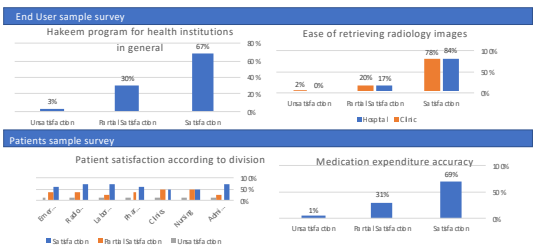
USTDA study

A study was conducted by U.S. Trade and Development Agency's study for medical expenditures to assess the impact of implementing Hakeem in the pilot sites in Jordan after 6 months of the implementation (Y2011- Y2012) :

- Medication savings: 24 %
- Radiology Films :
  - ✓ The Value of Saving in CT Scan films : 86 %
  - ✓ The Value of Saving in x-ray films : 98 %
  - ✓ The Value of Saving in MRI films : 91 %

Benefits of Hakeem program

2016 study Included 2865 patients and 2250 end users in 20 sites



About VistA

- VistA has benefited from more than 30 years of continuous, clinician-driven improvement.
- VistA serves nearly 9 million Veterans as part of the largest healthcare system in the United States.
- VistA serves more than 1,800 hospitals and other healthcare providers around the world.

About VistA

- A comprehensive system for managing both large and small healthcare facilities, providing functions ranging from prescription refills to employee timekeeping.
- The New York State Office of Mental Health has chosen VistA system throughout its 24-hospital- 310-clinic healthcare system that provides mental health services to 700,000 people a year.
- West Virginia (WV) Department of Health & Human Resources (DHHR) has chosen VistA system throughout its 7 healthcare facilities through the Bureau for Behavior Health & Health Facilities (BHHF).

Why VistA is the choice?

- VistA is compliant with international standards including: HIPAA, CCHIT and Meaningful use.
- A 2011 survey conducted by the American Academy of Family Physicians ranked VistA's primary user interface in the top 10 for user satisfaction, and first in several other categories.
- Medscape EHR reports from both 2014 and 2016 rank the VA's computerized record system number one with physicians and in its usefulness as a clinical tool.

Ref
http://www.medscape.com/features/slideshow/public/ehr2016#page=1
https://www.medscape.com/public/ehr-2016

Why VistA is the choice?

- Cost effectiveness.
- Building capacity and sustainability.
- Built on evidence based medicine.
- Low risk, large active community.

VistA

open source

Expected Challenges

- Funding
- Change resistance
- Standardization
- Choosing the right solution
- Lack of domain expertize

Impact of EHSI on the Jordanian Economy

Interoperability
MOPH Plan

Ali Romani, MSc
June 15, 2019

REPUBLIC OF LEBANON
MINISTRY OF PUBLIC HEALTH

EHR READINESS

BUILDING CONSENSUS ON THE READINESS FOR EHR IN LEBANON

Mr. Ali Romani

Email: a_roumani@yahoo.com

IT Project Manager at the Ministry of Public Health.

Led several IT projects including: systems interoperability and unique ID, electronic health record, Primary health care network information system PHENICS…and many others.

What is interoperability

- **Interoperability** is the ability of different information systems, devices or applications to connect, in a coordinated manner, within and across organizational boundaries to access, exchange and cooperatively use data amongst stakeholders, with the goal of **optimizing the health of individuals and populations**.

Levels Of Interoperability

The Healthcare Information and Management System Society (HIMSS) has come up with four levels to define what qualifies as interoperability:

- **"Foundational"** interoperability develops the building blocks of information exchange between disparate systems by establishing the inter-connectivity requirements needed for one system or application to share data with and receive data from another. It does not outline the ability for the receiving information technology system to interpret the data without interventions from the end user or other technologies.

Levels Of Interoperability

- **"Structural"** interoperability defines the structure or format of data exchange (i.e., the message format standards) where there is uniform movement of healthcare data from one system to another such that the clinical or operational purpose and meaning of the data is preserved and unaltered. Structural interoperability defines the syntax of the data exchange. It ensures that data exchanges between information technology systems can be interpreted at the data field level.

Levels Of Interoperability

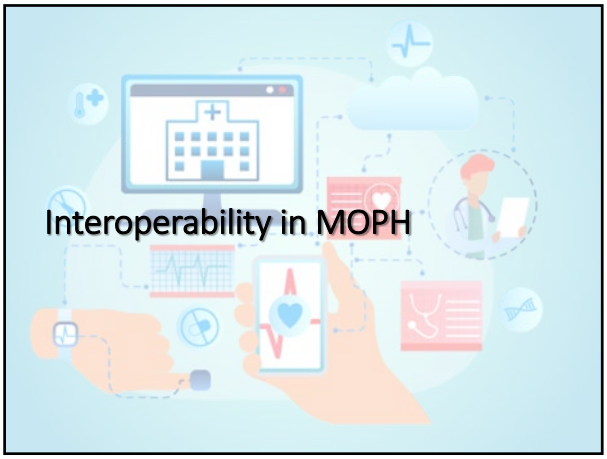
- **"Semantic"** interoperability is the ability of two or more systems to exchange information and to interpret and use that information. Semantic interoperability takes advantage of both the structuring of the data exchange and the codification of the data, including standard, publicly available vocabulary, so that the receiving information management systems can interpret the data. Semantic interoperability supports the electronic exchange of patient data and information among authorized parties via potentially disparate health information and technology systems and products to improve quality, costs, safety, efficiency, experience and efficacy of healthcare delivery.

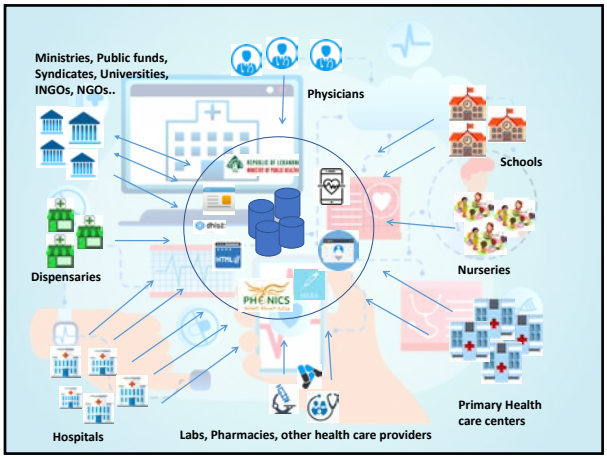
Levels Of Interoperability

- **"Organizational"** interoperability encompasses the technical components as well as clear policy, social and organizational components. These components facilitate the secure, seamless and timely communication and use of data within and between organizations and individuals. Inclusion of these non-technical considerations enables interoperability that is integrated into end-user processes and workflows in a manner that supports efficiencies, relationships and overall health and wellness through cooperative use of shared data both across and within organizational boundaries.

What Is A Health Information Exchange (HIE)?

- A Health Information Exchange (HIE) is a technology solution that enables Healthcare providers and organizations to share patient information electronically between systems **according to nationally recognized standards**.





Data exchange between MOPH and hospitals (example)

- Billing system (flat files upload)
- Death registry (Data entry and flat files upload)
- Births registry (Data entry and flat files upload)
- Maternal mortality (Data entry)
- Implantable devices tracking system (Data entry)
- Communicable diseases reporting "DHIS2" (Data entry)
- Other systems and reports (Dialysis report, PHENICS referrals, …)

Challenges

- Lack of a unique patient identifier
- Different coding systems
- Different data structure
- Different data exchange structure and technologies
- Readiness of the systems to use modern standards and technologies to exchange data
- Trust
- Security and data confidentiality

Interoperability solution

Build a centralized system to store, maintain and publish all parameters used in the information systems which include but not limited to:

- **Health care providers**: Hospitals, dispensaries, physicians, nurses, pharmacies, laboratories, ..
- **Locations**: Mohafaza, qada, villages
- **Patient demographic and personal data**: sex, marital status, profession, education, …
- **Medical data**: drugs, vaccines, diagnosis, lab tests, Radiology, allergies, medical acts and procedures, …
- …..

Interoperability solution

Adapt and implement standards to exchange data between systems:

- HL7
- FHIR
- HIPAA
- …

Interoperability solution Pilots in MOPH

- EPI registry interoperability
  - Adaptation of HL7 standard (**VXU^04**)
  - Implementation of data exchange tool (Mirth Connect)
  - Pilot data exchange with EPIC
- PHENICS interoperability

Interoperability solution Next Step

- Adapt HIE standards for all systems
- Implement HIE systems and tools.
- Share the standards and technologies with all stockholders.
- Replace the current data exchange tools with the new HIE tools

Thank you

Appendix 7: Lebanon Health IT Stakeholders who participated in this activity

(Plain names are listed alphabetically without title or rank & abbreviations used to indicate organizations)

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