

eSanté

EFES

Report WP15-1

Promotion of an eHealth program

eSanté team

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1. EXECUTIVE SUMMARY

This document provides recommendations to responsible of the ehealth program for the promotion of the national eHealth platform in Luxembourg. Specifically, this document explores ways to promote end user adoption of new technologies by examining eHealth initiatives in other countries. Because of the lack of availability of such documentation, the eSanté team reviewed also current scientific literature in order to assess the technical and cultural barriers related to ICT adoption in the healthcare sector. Adoption of ICT in healthcare involves three key stakeholder groups. First, the end users of any HIT initiative, the healthcare professionals and healthcare delivery institutions, who need to be made aware of all benefits envisioned under the proposed platform and whose commitment is critical for the overall success of the project. The second group is the IT companies that will develop solutions according the expressed needs and standards selected at the national level. By securing the participation of key members from each of these groups, working groups (regardless of the topic) will be able to better assess both the technical feasibility of different solutions and any local barriers to adoption. The last stakeholder is the patient, whose adhesion is critical to the success of the platform, even if most of them will follow the advice of their Healthcare provider.

For each of these groups, the eSanté team identified barriers according to the main eight categories of barriers to the adoption described in the literature:

- Financial
- Technical
- Time
- Psychological
- Social
- Legal
- Organizational
- Change Process

We developed our recommendations that could ease the adoption or the acceptance of ICT tools in Healthcare, based on six main dimensions:

- **A Program Roadmap** - establish clear health policy goals and link them with a long-term implementation strategy,
- **A demonstration of benefits** - have the ability to demonstrate clearly the benefits of the program (both medically and financially).
- **Legal / Data protection issues** - address patient data protection issues and understand related national legal issues, Leadership - provide strong leadership combined with effective project management,
- **Program acceptance mechanisms** - ensure transparent change management and acceptance mechanisms. A clear strategy has to be defined to integrate user:
 - ✓ Regular communication event championed by sympathetic HCPs,
 - ✓ Representation of users representatives inside the board of the agency,
 - ✓ Use cases definition inside project usergroups,
 - ✓ User appropriation work group about value-added services.

For the user appropriation work group, the commitment and involvement of all stakeholders are necessary to discuss changes in workflow processes and adoption issues such as support, incentives, payment schemes, training.... Start the discussion with a demonstration of the practical outcomes (satisfaction surveys, examples of patient cost savings, etc.) and the value (return on investment - ROI) of the different services.

- **Standards** - assess the current state of interoperability in the local market, promote standards locally, assess the costs and benefits of adopting interoperability standards and produce a public interoperability framework that defines common standards for use in Luxembourg managed by an on-going committee (public actors & IT providers) to create a roadmap for future changes. Identify areas for product certification and develop the certification program testing and approval criteria. Explore financial and legal incentives for the adoption by health care providers of certified software or standard compliant IT services.

Based on those five dimensions and barriers faced by other countries, a synthesis of possible strategies to overcome barriers are highlighted. Those mitigation strategies are now to be confronted with the specific context of the Luxembourg and specificities of its eHealth program and projects.

Based on this preliminary work, we propose to work in the detailed definition of related action plans to be implemented by the future eHealth management agency. Establishing the agency is of course the first step.

1. INTRODUCTION

Electronic Health Record Systems store very intimate, private, medical related information of patients. This information is the base for better diagnoses and better treatments. Today, this kind of information is already kept in isolated island systems within the so called primary systems like hospital-, radiology-, laboratory-information-systems (HIS, RIS, LIS), and General Practitioners' systems. The improvement is to build up a national eHealth platform for sharing and exchanging subparts of this information, i.e., the relevant health information of each patient.

The goal of this document is to provide recommendations to a national agency responsible for the promotion of the national eHealth platform in Luxembourg. Specifically, this document will explore ways to promote end user adoption of new technologies by examining information documented in past eHealth initiatives in other countries.

Background

By the end of 2006, the Luxembourg government had adopted a national eHealth plan which had been developed via a working group composed of stakeholders from the local health sector. This action plan recommends the implementation of an ICT (Information Communications Technology) platform providing services to support the exchange and sharing of health related data.

In order to implement these recommendations and further develop the eHealth plan, the Ministry of Health created the eSanté program. The objectives of this program are to:

- Improve the quality and the performance of health care in Luxembourg by providing health care providers (HCP) better access to medical data;
- Propose health information technology (HIT) initiatives to advance the exchange or sharing of medical data between health care professionals;
- Promote transparency in health care services by offering information in electronic form to patients and to health care professionals;
- Assure the interoperability of health systems with those of other European countries in order to guarantee a better level of care for mobile patients and to facilitate the mutual exchange of medical expertise.

As part of the eSanté program, the eSanté-EFES (Feasibility Study) project was implemented and it consisted of two phases: the first, an analysis of the current state of IT adoption and the identification of health care professionals HIT needs; followed by a second phase, which proposed concepts and solutions to satisfy the identified needs. The first phase of the eSanté-EFES project has:

- Analyzed the current situation of the Luxembourg health care sector in order to improve knowledge concerning the current use of IT in the sector,
- Determined the existing relationships between the different actors,
- Identified the current exchange of data between actors

- Identified further needs with respect to the exchange and sharing of health related data.

The results carried out in the first phase of the project are publically available via this link: <http://www.santec.lu/project/esante/efes/start>

These results have been used in the second phase for specifying new services, interactions and potential exchanges between health care providers, health care institutions, governmental departments and other service providers. New solutions will be proposed to facilitate the exchange and sharing of medical data and to reduce administrative procedures and costs.

These proposed solutions will naturally lead to modifications of existing work processes. Even if these proposals have a minimal impact on the current workflow and procedures of health care professionals, it is expected that people will be naturally resistant to change. This document analyzes the potential barriers to the adoption of eSanté platform services and provides recommendations to overcome them.

Goals & Methods

This report provides a reflection on the promotion of services to be developed for the Luxembourg eSanté platform by its management board. The document focuses on a national Electronic Health Record (EHR). To achieve this, the eSanté team made a review of current scientific literature in order to assess the technical and cultural barriers found in other national eHealth programs. The eSanté team tried also to find similar promotion planning documents for other countries. It contacted Austria, Belgium, Greece and Portugal. They reported that they did not have such a document and could not provide a plan for their marketing approaches. Incentives for adoption (if any) were only developed on a case by case basis. Then, based on an analysis of the current state of practice of promotional activities for health care system interoperability and by leveraging past professional experiences from internal competencies, the eSanté team proposed a set of recommendations to overcome barriers to eHealth initiatives and to facilitate the adoption of services, tools and standards. Because of the lack of such documents a national EHR, it was difficult to suggest concrete recommendations. Therefore, the eSanté team researched general barriers to Electronic Medical Record (EMR) adoption as faced by health care providers and technology providers and provided a set of recommendations for use by all future stakeholders involved in promoting HIT. EMR literature has been mainly used because we considered that a national EHR shares most of its barriers. Then we added the sharing dimension that an EMR restricted in scope to a medical domain does not have.

2. BARRIERS TO EHR ADOPTION

From an extensive but not exhaustive review of literature on national EHR adoption problems it is clear that organizational, social and human issues were more difficult to overcome than purely technical ones¹. In order to understand the context of these issues, a high level analysis of any potential barriers to adoption should be made. This analysis of the barriers to adoption will lead to the identification of specific promotional activities that should be implemented in order to accelerate the successful adoption of a national eHealth program. The following sections will document the barriers for health care providers, IT providers, and other relevant barriers identified by the research community. As an exhaustive review of all types of health care providers has not been performed, for simplicity all barriers specific to the physician have been considered extendable to all categories of health care providers.

2.1. BARRIERS TO EHR ADOPTION: THE HEALTH CARE PROVIDERS' PERSPECTIVE

As health care providers are the first users impacted by any eHealth initiative, it should come as no surprise that key barriers to adoption will involve these stakeholders. Recently a review of the scientific literature was published that tabulated, based on 22 studies, the reasons why physicians would resist the adoption of any EMR technologies. EMR issues can be extended to a national EHR in addition of the issue of the data sharing. From this review a taxonomy of these issues was developed. Below is an abridged table reflecting the review's findings. This table has been found to be highly coherent by the eSanté team and we have decided to use it as a common thread for developing and organizing this report. By building on the concepts presented in this table, each section of the report will add new information that will result in a "barrier avoidance" strategy table for Luxembourg's eHealth stakeholders.

¹ E. Deutsch, G. Duftschmid, W. Dorda, Critical areas of national electronic health record programs—Is our focus correct?, International Journal of Medical Informatics 79 (2010), 211 - 212

| Category | | Barriers | References Reported per Barrier (n=22) |
|------------------------------------|----------------|--|--|
| Primary barriers | Financial | High Start-up Costs | 12 |
| | | High On-going Costs | 11 |
| | | Return on Investment (ROI) Uncertainty | 8 |
| | | Lack of Financial Resources | 2 |
| | Technical | Lack of computer skills of the physicians and/or Staff | 10 |
| | | Lack of technical training and support | 9 |
| | | Complexity of the system | 2 |
| | | Limitation of the system | 2 |
| | | Lack of Customizability | 5 |
| | | Lack of Reliability | 3 |
| | | Interconnectivity/Standardization | 8 |
| | | Lack of computers/hardware | 2 |
| | Time | Time to select, purchase and implement the system | 5 |
| | | Time to learn the system | 7 |
| | | Time to enter data | 6 |
| More time needed per patient | | 8 | |
| Time needed to convert the records | | 2 | |
| Secondary barriers | Psychological | Lack of belief in EMRs | 3 |
| | | Need for control (loss of control or influence) | 2 |
| | Social | Uncertainty about the vendor | 3 |
| | | Lack of support from external parties | 3 |
| | | Interference with doctor-patient relationship | 3 |
| | | Lack of support from other colleagues | 2 |
| | | Lack of support from the management level | 2 |
| | Legal | Privacy or security concerns | 10 |
| | Organizational | Organizational size | 6 |
| | | Organizational type | 2 |
| | Change Process | Lack of support from organizational culture | 2 |
| Lack of incentives | | 2 | |
| Lack of participation | | 1 | |
| Lack of leadership | | 3 | |

Table 1: Ranking of Reported Barriers to EMR Adoption by Physicians²

The above Table 1 shows that most physicians are concerned with financial, technical and time issues. These high level categories can be more concretely interpreted as concerns with the **financial costs of EMR** IT systems (initial start-up costs as well as training and continued support costs), the lack of **understanding of the capabilities** of existing EHR systems (security of data, software customization to meet existing workflow requirements, reliability of the system/data, etc.) and **the loss of time due to system selection, training and modifications to existing workflows**. Physicians were reported to be especially concerned with the loss of time due to data entry and the conversion of this lost time into a reduced number of patients that could be assisted³. Interestingly, the above categories are interrelated, as a concern about the impact of a lack of incentives can be found in both the financial and the change process categories. The most revealing are the last two categories

² A. Boonstra, M. Broekhuis, Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions, BMC Health Services Research 2010, 10:231, <http://www.biomedcentral.com/1472-6963/10/231>

³ D. Ludwick, J. Doucette, Adopting electronic medical records in primary care: Lessons learned from health information systems implementation experience in seven countries, International Journal of Medical Informatics 78 (2009) 22–31, Page 27

in this table: organizational and change management. While it is not reflected as a key issue by physicians in the report, it is here that we begin to see evidence that these two issues can play an important role in mitigating the barriers to EHR adoption by physicians. To clarify, organizational barriers concern factors such as physician office size (physicians in large practices or offices tend to be more open to the adoption of new EHR programs as they have access to more resources) and whether or not a physician's adoption of an EHR solution is influenced by the hospital they are affiliated with. Change processes involve factors such as the level of program leadership and the level of commitment by project champions. It also includes the importance of offering incentives, which have been identified in this report to be a key adoption factor for individual physicians.

For physicians or administrative staff, **the use of userfriendly systems** played a significant role in adoption.⁴ For instance, new eHealth services or functionalities could be integrated in their current systems that are familiar to use. Works on specific design of software could improve specific diagnostic process or workflow and be key for adoption.

This review of the literature provides an excellent introduction to general barriers for an EMR but those barriers specific to a national EHR for Luxembourg are naturally missing. The multilingual environment found in Luxembourg is an important barrier that may not be reflected in studies performed in other countries. In Luxembourg, inside a same Health care institution, it is often that a part of the staff works in one part French, and the other part in another in German. The national EHR has to deal with the multilinguism of its documentation and find some semantic tools to enable the view of some document in the language of the reader (French or German only). In order to provide the highest level of comprehension by HCPs and the public, any information concerning eHealth initiatives should also be made available in several languages (i.e. French, German, and Portuguese).

Additionally, in Luxembourg the culture of information sharing between HCPs is not so developed. Payment schemes are rarely favoring collaboration and therefore information sharing. In most of the case, HCP only exchanges a minimum set of information between when needed. In opposition, in France, a care networks (filières des soins) have been developed to make easy the exchange of data for each chronic disease. The eSanté platform could be a great opportunity to develop these services.

eHealth project, that does not respect **privacy** in an appropriate way, can cause problems⁵. A lack of attention to privacy issues during the early stages of a project may have a catastrophic impact later on.

While not evident in the table, HCPs are concerned with both standards used in their EMR systems as well as those imposed in a national EHR, but this concern focuses more on the sustainability of these systems⁶. HCPs want warranties that the data entered into these systems will remain accessible throughout the life of a patient (at a minimum). The use of standards could enable the export of data to a new system when upgrades are needed. Therefore, it is important to address the issue of standards adoption by technology

⁴ D. Ludwick, J. Doucette, Adopting electronic medical records in primary care: Lessons learned from health information systems implementation experience in seven countries, *International Journal of Medical Informatics* 78 (2009) 22–31

⁵ L. Esterle, A. Kouroubali et al, Political and Organisational Factors Influencing Large Scale Implementation of Electronic Health Records : Recommendations for a Realistic Implementation Plan, 2010, <http://www.ehr-implement.eu>

⁶ Based on interview with Dr F. Berthet, Direction de la Santé

providers.

2.2. BARRIERS TO EHR ADOPTION: THE TECHNOLOGY PROVIDERS' PERSPECTIVE

While it is important to understand the barriers noted by HCPs, it is equally important to understand the barriers that IT providers or IT project managers face when asked to implement a technical solution. From a limited review of the literature, it is clear that barriers from previous programs involved the following:

- A lack of standards in several areas (decision support, confidentiality, interoperability, system testing, etc.) can restrict IT providers from providing a cost effective solution to customers⁷.
- Given the complex scope of national EHR implementations and the long period necessary for adoption, system requirements can change significantly from the start of the program until it is ready for the pilot phase⁸.
- IT providers cannot offer a high degree of software customization or services to a small market due to economies of scale⁹.
- For IT providers, health care institutions often have difficulty making technical staff available in order to assist implementers with workflow design, network support and system integration¹⁰.

2.3. BARRIERS TO EHR ADOPTION: THE PATIENTS' PERSPECTIVES

Patient is an important stakeholder for the adoption of a national EHR. Nevertheless, the majority of patient trusts their HCP and follows their advices. Moreover, we can consider that the opt-out patient consent chosen in Luxembourg should ease the adoption of the national EHR by the patient. Therefore, applying the principle - convince the physician, he will convince the patients - the author of this report does not develop a detailed list of the patients' barriers.

Patients's barriers identified in the literature can be linked to a variety of topics including: the, usability issues, privacy concerns or legal liability, and the public's understanding¹¹ and use and access to internet based services by different social classes¹². While these items may not have been a key factor in the failure to adopt a specific program, they are mentioned as credible components that should be examined as part of any eHealth promotional program.

⁷ F. Sabogal, EHR Adoption: A Barrier Analysis, DOQ-IT,

http://www.google.com/url?sa=t&source=web&cd=1&sqi=2&ved=0CBIQFjAA&url=http%3A%2F%2Farchive.healthit.ahrq.gov%2Fportal%2Fserver.pt%2Fgateway%2FPTARGS_0_890598_0_0_18%2FEHR%2520Adoption%2520A%2520Barrier%2520Analysis.pdf%3Fwtag%3Dwtag731&rct=j&q=sabogal%20EHR%20adoption%20a%20barrier&ei=ijUsTc2yIlaAOvTogN4K&usq=AFQjCNFcEGiNdNqh9Q6DryEQ1RLED6oAAA&sig2=ZIU0Nph19T9diBEO61mgw&cad=rja, downloaded on 11/01/2011

⁸ L. Esterle, A. Kouroubali et al, Political and Organisational Factors Influencing Large Scale Implementation of Electronic Health Records : Recommendations for a Realistic Implementation Plan, 2010, <http://www.ehr-implement.eu>

⁹ D. Ludwick, J. Doucette, Adopting electronic medical records in primary care: Lessons learned from health information systems implementation experience in seven countries, *International Journal of Medical Informatics* 78 (2009) 22–31

¹⁰ HIMSS (2003), 14th Annual HIMSS Leadership Survey, Healthcare Chief Executive Officer Results, Healthcare CIO Survey Final Report, http://www.himss.org/2003survey/docs/healthcare_cio_key_trends.pdf Accessed on 11/01/2011

¹¹ P. Tang, J. Ash, et al, Personal Health Records: Definitions, Benefits, and Strategies for Overcoming Barriers to Adoption, *Journal of the American Medical Informatics Association* Volume 13 Number 2 Mar / Apr 2006

¹² N. Hardiker, M. Grant, Factors that influence public engagement with eHealth: A literature review, *international journal of medical informatics* (2 0 1 0)

By utilizing the framework first used with the HCPs (Table 1), we can organize the two sets of information (HCP Barriers and Technology Provider Barriers) into the following Table 2:

| Category | Health Care Provider Barriers | Technology Provider Barriers |
|----------------|---|---|
| Finance | Start up and ongoing IT support costs | IT providers will only provide solutions for products & services that are profitable. Standards not widely adopted or utilized only in a small market increase the costs of doing business. |
| Technical | Increased training requirements & IT platform capability questions. User friendly systems | IT providers need technical input/resources from customers. New standards may increase the technical complexity of a system and raise questions about testing for compliance. |
| Time | Lost time due to training, work flow changes & fewer patients can be served | Changes in technical architecture may affect delivery dates for customers. |
| Psychological | Loss of some control and/or lack of belief in EHR solutions | Health care providers more open to working with existing/known IT solutions. Companies need to be involved at the earliest possible stage when standards based projects are involved so that their perception of risk is lowered. |
| Social | Unsure about reactions from colleagues and other stakeholders. | In cases where the public may be implicated (PHR), information concerning privacy and general medical terminology/procedures becomes important. Changes in how people receive care can lead to adoption resistance. |
| Legal | Privacy or security concerns | Impact analysis of legal issues necessary prior to launch of each project. Enforcement of standards compliance is of interest to IT providers and customers. |
| Organization | Questions concerning the scope and scale of involved organizations (who is responsible for what and with what authority/mandate). | IT providers need standards (interoperability & privacy) to develop new products/services. IT providers need one organization to manage transition issues related to standards and compliance. |
| Change process | What leadership will be involved, what incentives are involved, who will participate? | IT providers need central authority to manage long-term projects for multiple clients. IT providers will need help with compliancy testing and certification. |

Table 2: Comparison of barriers to the adoption specific to HCPs and IT service providers¹³

¹³ Internally at Santec, several resources who have worked with HIT companies in the past were surveyed to determine if any additional barriers could be identified and this information has been incorporated into our list of technology provider barriers.

3. GENERAL RECOMMENDATIONS FOR THE PROMOTION OF EHEALTH PROGRAMS

After documenting the barriers to adoption, we will now focus on developing recommendations for the future eSanté agency. This section will start with a brief analysis of promotional components as documented in the literature in other national eHealth initiatives. Promotional components are defined as those elements of a program that would ease the adoption or the acceptance of a program's goals. Based on this research, we will then describe in more detail the components that we believe should be the core of a promotional plan based on our analysis.

Deutsch¹⁴ clearly demonstrated, in his study of five national¹⁵ Electronic Health Record programs, that close attention must be paid to the following components if the program's stakeholders wish to reduce the risk of an unsuccessful eHealth/EHR initiative. Program leaders should focus on (in no specific order of importance):

- **A Program Roadmap** - establish clear health policy goals and link them with a long-term implementation strategy,
- **A demonstration of benefits** - have the ability to clearly demonstrate the benefits of the program (both socially and financially) and provide up to date information on the different funding mechanisms which will be used to support the program.
- **Legal / Data protection issues** - address patient data protection issues and understand related national legal issues,
- **Leadership** - provide strong leadership combined with effective project management,
- **Program acceptance mechanisms** - ensure transparent change management and acceptance mechanisms (involving health care providers, technology providers and patients)

This report will now examine in more detail a few of these components.

Program acceptance in this context refers primarily to the addressing of concerns that health care providers may have (changes in workflow, increased financial costs, etc.) within a specific implementation of an EHR solution. Change management refers to the processes or organizational changes that will need to occur in a system during the migration to a new structure or framework – in most cases the changes will impact the physician's office, hospital or private lab. This component was first identified in the HCP barriers section but not as a key barrier from a HCP's perspective. Deutsch's findings confirm the importance of this component.

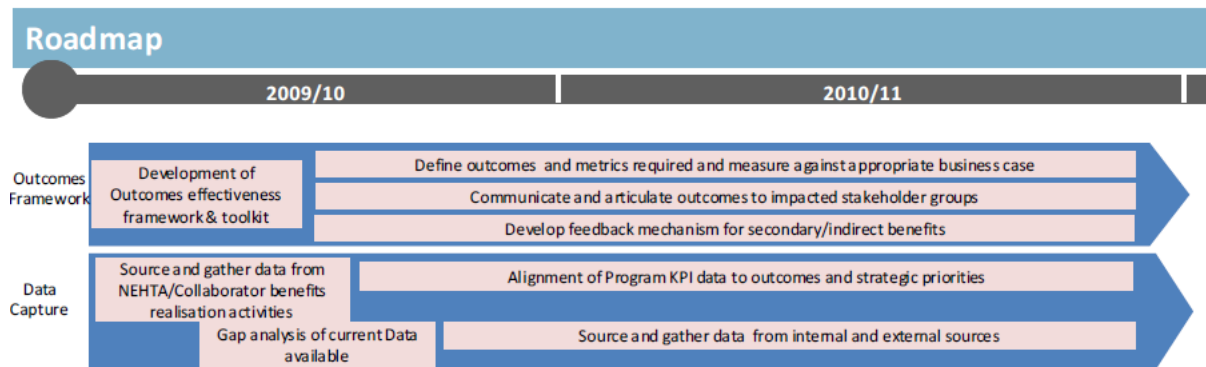
Another important issue raised in this study was the importance of **demonstrating the benefits of the program** to all stakeholders. This component goes hand in hand with the creation of communication tools explaining the expected costs and benefits of the project. Studies of the literature found that for several national programs it was difficult to realize this component. One of the few examples¹⁶, that we found, was from a recently developed

¹⁴ E. Deutsch, G. Duftschmid, W. Dorda, Critical areas of national electronic health record programs—Is our focus correct?, International Journal of Medical Informatics 79 (2010), 211 - 212

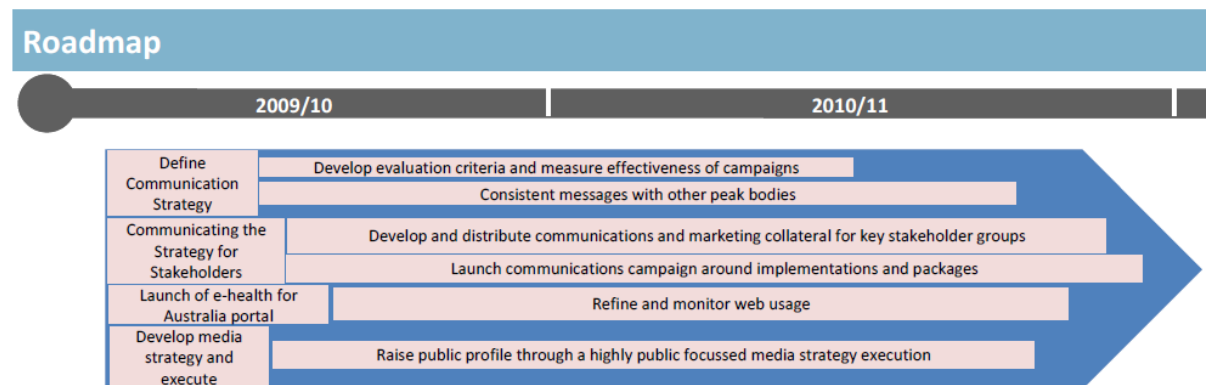
¹⁵ England, Germany, Canada, Denmark and Australia

¹⁶ NEHTA Strategic Plan 2009 to 2012, Australia's National E-Health Transition Authority Ltd, www.nehta.gov.au

Australian eHealth strategy. They developed first outcomes and planned benefit for each business case.



Then, later in the same document, they define the communication strategy for each stakeholder.:



As eHealth/EHR, projects are long-term initiatives that require significant funding, **communications about the distribution of funds to different actors**, and the time frames involved for the realization of different projects within the program, were also reported to be difficult to master.

Finally, given the technical complexity of EHR programs and the diverse interests of different stakeholders, **project management/program leadership** concerns were found to be another important topic for national EHR implementations.

By utilizing the data gained from Tables 1 and 2, we can now combine both the barriers and initial recommendations into one table that organizes the possible strategies to overcome EHR adoption barriers from the perspective of the key adopters – the HCPs. Table 3 is presented below; the technology provider barriers have been put in grey in order to ease the reading of the HCP barriers and their related potential intervention strategies.

| Category | HCP Barriers | Technology Provider Barriers | Possible Barrier-related Intervention Strategies Specific to HCPs ¹⁷ |
|----------------|--|---|--|
| Finance | Start up and ongoing IT support costs | IT providers will only provide solutions for products & services that are profitable. Standards not widely adopted or in a small market increase the costs of doing business. | Provide documentation on project/program benefits (return on investment). Show profitable examples from other EMR implementations. Provide financial incentives or other compensation. |
| Technical | Increased training requirements & IT platform adoption questions | IT providers need technical input/resources from customers. New standards may increase the technical complexity of a system and raise questions about testing for compliance. | Educate physicians and support new and continuous training programs. When possible, adapt systems 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. Engage third parties for support during implementation. |
| Time | Time lost due to training, work flow changes (fewer patients being served) | Changes in technical architecture may affect delivery of existing software to customers. | Provide support during implementation phase to convert records and assist. Provide training sessions to familiarize users. Implement a user-friendly help function (help desk). When possible, explore the redesign of workflows to achieve a time gains |
| Psychological | Loss of some control and lack of belief in EHR solutions | Health care providers more open to working with existing/known IT solutions. Companies need to be involved at the earliest possible stage when standards are involved. | Provide information (forums, workshops) on the usefulness of the EMR Include trial period. Demonstrate gained efficiencies (technical & work related). Start with voluntary adoption requirements. Enable early adopters (physicians) demonstrate the system. Adapt system to current medical practice as much as possible. |
| Social | Unsure about reactions from colleagues and other stakeholders. Unsure of IT providers' capabilities. | In cases where the public may be implicated (PHR), information concerning privacy and general medical terminology/procedures becomes important. Changes in how people receive care can lead to adoption resistance. | Provide information (forums) on the advantages and disadvantages for doctors and patients. Information and support from physicians who are already users. Ensure support, leadership, and communication from management. |
| Legal | Privacy or security concerns | Impact analysis of legal issues necessary prior to launch of each project. Enforcement of standards compliance is of interest to IT providers and customers. | Develop requirements on safety and security in cooperation with physicians and patients. Ensure EMR system meets these requirements before implementation. Communicate openly on safety and security issues. |
| Organization | Questions concerning the scope and scale of involved organizations. | IT providers need standards (interoperability & privacy) to develop new products/services. IT providers need one organization to manage transition issues related to standards and compliance. | When possible, redesign workflow to realize a better organizational fit (e.g: controlled prescriptions). Adapt EMR view to HCP type ¹⁸ . Adapt EMR to type of medical practice |
| Change process | What leadership will be involved, what incentives are involved, who will participate? | IT providers need central authority to manage long-term projects. IT providers will need help with compliancy testing and certification. | Select a project champion, preferably an experienced physician. Let physicians (or representatives) participate during the implementation process. Communicate the advantages for physicians. Use incentives. Ensure support, leadership, and communication from key stakeholders. |

Table 3: Perceived barriers and potential intervention strategies

¹⁷ A. Boonstra, M. Broekhuis, Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions, BMC Health Services Research 2010, 10:231, <http://www.biomedcentral.com/1472-6963/10/231>

¹⁸ Original statement "Adapt EMR to organization type"

4. RECOMMENDATIONS FOR LUXEMBOURG'S EHEALTH AGENCY

This last section will combine literature recommendations (section 3) with those developed in the barrier analysis (section 2). Then we will use our table format as means to highlight the proposed recommendations.

4.1. HEALTH-POLICY-RELATED GOALS AND IMPLEMENTATION STRATEGY

The eSanté platform should be seen as both a driver of public policy goals and an entry point where HCPs can become engaged in the program; the introduction of HITs will create new efficiencies and will therefore modify existing work processes. A logical first step is then to understand the existing culture of the health sector and to suggest a step-by-step approach. Establishing health policy related goals are essential to position the platform in the medical landscape so that all interested parties can openly assess its purpose and direction and then make informed decisions. Commitment from key policy makers must be demonstrated (typically via a road map type of document) and should include a long term vision for HIT as a mechanism for solving national health care issues. Based on the health care needs of the country, key areas for investment can then be identified. For example, chronic diseases (such as diabetes, asthma, etc.) can be better coordinated by the sharing of data. Treatment efficiencies can be improved upon by using telemedicine systems (for example: tele-diagnosis of stroke victims in France¹⁹).

The first phase of the eSanté program with its EFES (feasibility study), CARA (image report) and LABO (lab report) projects, was a period of assessment of the current state of Luxembourg's health information systems and the initial definition of the platform. In this phase, we tabulated the current data exchange process, assessed data needs not currently covered and analyzed gaps between IT systems in the communications layer. The second phase should carry on with the implementation of the first phases' functional projects (CARA, LABO) and should start to organize medical projects in line with the directives established by the health-policy-related goals. It is important that the first projects be selected in such a way that prioritizes their achievement complexity (lower complexity first to establish confidence), their medical outcomes and perceived level of health care providers' support. This support implies the engagement of early adopters' health care representatives who will be involved in the project assessment / selection process.

The creation of a road map should promote a strategic cooperation between the national eSanté agency and local actors (health care providers and IT companies).

A high degree of political sponsorship is necessary for this process given the scope of the changes that will be required. This political commitment can help to speed up negotiations, facilitate project management and contractual agreements with suppliers as well as support research and development designed to improve on the current capabilities of HIT. The health policy strategy should be communicated publically as demonstrated in the previous section.

¹⁹ See by example Tele AVC - Réseau Urgence Neurologique Franche-Comté in the document « Panorama des initiatives de téléradiologie dans les territoires » made by the French agency, ASIP:
http://esante.gouv.fr/sites/default/files/ASIP_PanoramaTeleradiologie.pdf

4.2. DOCUMENTING BENEFITS AND THE USE OF PUBLIC RESOURCES

As a means to promote user adoption of a new service or technology, it is important to clearly communicate the overall benefits that the new service will provide to the stakeholders as well as how this change fits into the larger, long term health care strategy. Before the kick-off of any project, it is important to assess and document cost-benefit expectations in order to demonstrate the link between expected improvements in health care and the public funding that is driving the program. An evaluation framework can be set up to measure these benefits. Generally, assessments of medical projects focus on²⁰:

- Clinical outcomes (patient clinical status, patient safety, length of stay mortality rates, decreased medication errors, improved adherence to practice guidelines, improved quality of documentation, improved communication, role and job performance impact, etc.),
- General satisfaction (assessment of the reliability, speed of use, ease of use, adequacy of training, impact on productivity and patient care, etc.),
- Financial outcomes (Return on investment, cost-benefit ratio, etc.).

Measurement should be performed before (baseline), during (evolution) and after the project in order to ensure accurate assessments. (A post project analysis of costs can help to prove the actual saving of any resources during actual operation and provide the agency with a mandate to reinvest a part of the saved money into future projects). Occasional end user satisfaction studies can be also performed in order to measure progress.

As one possible proposal, we suggest the organization of a first large conference to demonstrate to future users some examples of health IT success stories from other countries (France, Belgium and Germany in order to have the conference cover most of the important languages of Luxembourg) and ask users of these success stories to share their experiences with a Luxembourg audience. The distribution of a brochure or promotional document highlighting these success stories could be an asset for platform promotion beyond the first conference. For example, the ANAP in France (Agence Nationale d'Appui à la Performance des établissements de santé et médico-sociaux) published two documents, one on French success stories²¹ and one on the benefits of health IT in France²².

Additional Avenues for Communication

Then regular smaller communication events could be organized each two months. Each event could focus on specific stakeholder to have small group and enable the discussion with the attendees. An event could be dedicated to regional projects owners and then another event dedicated to health IT providers. Some events can be dedicated to patient representations but do not organize them more than twice a year. As seen in the barriers chapter, patient is not the stakeholder to convince absolutely.

In addition to the development of online communications platforms we suggest that the eSanté program be documented in conferences and professional journals. Throughout the lifecycle of each project, papers can be published in a professional journal²³ in order to

²⁰ Nielsen J. Usability engineering. San Diego, CA: Morgan Kaufman; 1993

²¹ <http://www.anap.fr/detail-dune-publication-ou-dun-outil/recherche/belles-histoires-des-systemes-dinformation-si/>

²² <http://www.anap.fr/detail-dune-publication-ou-dun-outil/recherche/creation-de-valeurs-par-les-tic-pour-les-structures-de-sante/>

²³ For example : Corps Medical [AMMD], Insight Secu [CNS], EHL info [EHL], Info-Point [Collège Médical], ANIL News [ANIL], etc.

demonstrate project benefits and advancements (milestones achievement) and to encourage other actors to use the new system.

4.3. BASIC LEGAL CONDITIONS AND DATA PROTECTION

From the literature, it became clear that in certain cases public debate on the merits of different aspects of eHealth programs, such as privacy, could seriously affect the scope and timeline of a national program²⁴. Information concerning important legal and privacy issues should be provided so that different stakeholders can make informed decisions when public policy is called into question. A legal framework can be a very valuable asset and prevent sterile debates by providing clear requirements for all actors. A proper framing (background and statements of support from different stakeholders) of legal requirements are important in order to reduce ambiguity. It is also important to communicate about security issues (data protection) in order to provide central support for all actors and to control adherence to legal regulations or best practices in IT security.

4.4. PROJECT MANAGEMENT

eHealth programs are long and complex and need professional project management executed by experienced project managers with clinical skills²⁵ in the field of project. The establishment of a suitable governance structure should enable a rapid decision process. The involvement of key stakeholders, who in addition to representing the end user, are critical to the design and validation of suitable and useful tools. Established project management methods such as Gareis, PRINCE 2 and PMI are recommended by Deutsch²⁶. Luxembourg has adopted an equivalent method for all publically funded IT projects: QUAPITAL. Adherence to project schedules in such complex projects is very difficult but can demonstrate professionalism and facilitate external communication. It is also recommended that project plans are not elaborated in detail beyond a period of six months but instead only provide a high level overview on the execution of future deliverables.

4.5. ACCEPTANCE AND CHANGE MANAGEMENT

Luxembourg's culture embraces consensus and naturally any proposed change to the health care status quo will develop some debate or resistance. Therefore it is of the utmost importance to invest both time and resources to facilitate users' acceptance of new solutions.

The reasons for adopting new technologies and tools should be strongly expressed by intensive communication from health authorities (Health ministry, CNS and ANIP), championed by sympathetic HCPs and supported by appropriate tools and incentives. Change management should be considered from the very start of each project. **Commitment and involvement** of all stakeholders, through teamwork and collaboration on the proposed project, should enhance the adoption rate.

In order to enhance acceptance, **changes in workflow processes have to be planned**

²⁴ L. Esterle, A. Kouroubali et al, Political and Organisational Factors Influencing Large Scale Implementation of Electronic Health Records : Recommendations for a Realistic Implementation Plan, 2010, <http://www.ehr-implement.eu>

²⁵ Medical degree

²⁶ E. Deutsch, G. Duftschmid, W. Dorda, Critical areas of national electronic health record programs - Is our focus correct?, International Journal of Medical Informatics 79 (2010), 211 - 212

with stakeholders by defining use cases that align functionality with user requirements. Provide the health care provider with use cases and pilot results on a website and professional journals in order to demonstrate the practical outcomes (satisfaction surveys, examples of patient cost savings, etc.) and the value (return on investment - ROI) of the different services.

It is important to **discuss adoption issues with all relevant stakeholders**. As a practical proposal, the creation of a “user appropriation” working group will demonstrate the willingness of the government to accompany users during the transition period and to reduce their fear of facing the burden of the transition alone. The objective of the working group has to be clear at the beginning. The outcome should be a set of guidelines and incentives designed to reduce the burden of the transition. A clear understanding of the current and the future situation of the stakeholders is necessary in order to begin this discussion. For each project in the portfolio we recommend consulting a sample of health care providers and to present to them the service that the agency would like to create. Then discuss their expectations and fears about the project and analyze the reasons for users to either adopt or reject the project. A possible method could be to list advantages and disadvantages of the current situation and compare them with the new situation. Research on disadvantages can be based on the barriers seen in the previous section. It seems appropriate to openly compare the current situation (status quo) with the proposed modifications and, if necessary, offer incentives to balance out the negative aspects. Ranking the incentives with the user can support the analysis process.

A clear strategy has to be define to integrate user, beyond those already cited (regular communication event, use case, user appropriation working group), we remind that HCPs are part of the board of the agency, so that they can be actively involved in the definition and priority assignement of value added services to be launched on the platform.

When public interest is strong, healthcare authorities can **offer support and incentives** to encourage the adoption of new technologies and promote innovation²⁷ in support of this public interest. Incentives can take the form of financial support for purchasing and implementing such HIT systems, or/and information exchange through the platform²⁸. This step will require the development and validation of a list of IT systems compliant with the platform in order to orient users towards eligible HIT systems. If possible, it is recommended that the use of a compliant solution should not made mandatory (i.e. healthcare provider is paid only if a medical report is sent to the platform). The health authority should support the health care provider by providing advice, recommendations and incentives. Incentives should never be given without first establishing clear and measurable objectives²⁹, for example, numbers of summary reports sent to the platform or level of processable data (as opposite of free text). Incentives should be set to sliding scales so that over time participants are required to participate more in order to earn the same level of incentive.

Some electronic services (like telemonitoring) may not be reimbursed or are not currently paid. This situation will, of course, hinder adoption. **Reimbursement or payment schemes** must be in line with the envisioned usage of the services of the platform.

²⁷ E. Coiera, Building a National Health IT System from the Middle Out, Journal of the American Medical Informatics Association Volume 16 Number 3 May / June 2009

²⁸ For instance in Belgium, doctors using certified EHRs could ask annually their social security system for a financial contribution. In 2009, the contribution for physicians for expenses related to the use of a certified EHR was worth 787 EUR. See: <https://www.ehealth.fgov.be/fr/page/website/home/platform/approval.html>
Law of the 6th February 2003: <https://www.ehealth.fgov.be/binaries/website/fr/pdf/AR-6-f-vrier-2003.pdf>

²⁹ In the United States, the concept of “meaningful use” is used to incentivize use of health IT, with payments attached to the testable achievement of specific goals.

Another way to help users of the new service is to **offer training**. During the rollout period, software companies involved with the project could organize the training. This measure can motivate software companies to assess the ROI of adapting their systems and can help ensure the support of users by their company.

General trainings on ICT in healthcare with a focus on the situation in Luxembourg and the national tools can also be inserted later by educational institutions (Lycée Technique pour Professions de Santé³⁰. Formation spécifique en médecine générale³¹ ...) and after (CFPC Dr Robert Widong³², SITEC³³ ...).

Insufficient availability of health care IT specialists, change management specialist and medical managers are recurrent in all countries and in Luxembourg the problem may be more severe. Public calls for a project³⁴ in line with health-related goals can be launched in order to find clinical managers willing to set up and manage medical projects using the platform. The level of financing being offered can be adjusted so that the government supports the majority of the project (example 80%) while still leaving room for a financial commitment from smaller actors. For example, participants could be given a set period of time (2 months) to make a project proposal to the new agency. Only projects supported by a health care provider would be chosen. The agency would support setting up the specific framework of the proposals in order to insure that the project would meet with pre-defined expectations while still allowing some flexibility for the HCP. At a minimum a proposal form, selection criteria and process should be made publically available in order to insure that the development, submission and selection acceptance criteria are clear. When possible, representatives of key stakeholders should be in an advisory position in order for the project to be accepted and supported by all actors in the sector.

The publication of a summary of the proposals and the final selection criteria should be published on the website and in a professional journal in order to keep the interest of third parties and to explain why certain proposals were refused.

4.6. TECHNICAL SOLUTIONS AND STANDARDS

It is important that IT providers adapt their product to the eSanté system. The topic of standards in any industry is a controversial one. Service providers must be part of the initiative as it greatly influences the creation and delivery of products. Governmental agencies, which typically monitor or initiate standards when they concern the public good, must be aware that **standards are always evolving** and that resources need to be set aside to manage this evolution. From E. Coiera's publication on national health IT systems the following statement describes the situation in an excellent way:

“However, standards are not static. They evolve in constant response to new technologies and new health care needs. Therefore, the longer a clinical IT system is in operation the less standards compliant it becomes, until at some point it has aged enough to attain “legacy” status. By definition, there is thus always a lag between standards as published and as implemented on the ground. We therefore need to see standards as targets, and moving ones at that, that guide the long-term convergence of local systems into an integrated but evolving NHIS (national health information system). Implementation never

³⁰ <http://www.ltps.lu>

³¹ http://www.en.uni.lu/formations/fstc/formation_specifique_en_medecine_generale

³² <http://widong.lu>

³³ <http://www.sitec.lu>

³⁴ An example of a project call in France is available here:

<http://investissement-avenir.gouvernement.fr/sites/default/files/user/AAP%20E-SANTE.pdf>

stops.³⁵”

Large IT providers will naturally have resources to analyse and participate in international standard initiatives such as the Integrating Healthcare Enterprise (IHE). **Smaller IT service providers** may have resources to monitor the evolution of standards, but may **lack resources to modify existing products** or have major problems in **absorbing the cost of training** their developers or support staff. From our analysis of the barriers and literature review we can provide the following recommendations for the promotion of standards and interoperability (again, in no particular order):

- a. **Develop a working group** specifically oriented to the topic of interoperability whose mission is to engage all local IT service providers and **assess the current state of interoperability** in the local market. **A public report should be produced** from this effort.
- b. Create a local, not-for-profit initiative to **provide information and resources for the promotion of interoperability standards locally** (e.g. HL7 Luxembourg asbl)³⁶. This may make access to standards easier (through lower costs) in addition to advancing general knowledge about standards and their use.
- c. Within the domain of this not-for-profit initiative, create a working group of IT providers and standards experts to **assess the costs and benefits of adopting one or more interoperability standards**. To address cross border data sharing concerns, a preference should be given to international standards already in use. IT providers would then provide feedback on the economic costs. The working group approach presented previously for health care providers can be reused here. Produce a **public interoperability framework** that defines common standards for use in Luxembourg, specifically those that promote the exchange of health data within the platform. Stakeholders can then assess whether or not to expand the interoperability framework for all health data exchanges in Luxembourg.
- d. Develop an **on-going committee** (public actors & IT providers) that manages the **adoption of standards** as well as the **roadmap for future changes**. The roadmap will help IT providers to plan for the future development of their products.
- e. Assess the possibility of developing a common communication plug-in in order to integrate IT systems so that development costs will be lowered for all IT providers.
- f. **Identify areas for product certification** and the mechanism by which an IT provider's products will be assessed. **Assess financial tools** (e.g. low interest loans, tax adjustments) that can be made available for **smaller vendors**.
- g. Work with IT providers and service providers to **develop the certification program** testing and approval **criteria**. This process will be continuous so an agency or public body must be involved.
- h. **Explore financial and legal incentives** for the **adoption by health care providers** or hospitals of **certified software** or standard compliant IT services.

³⁵ E. Coiera, Building a National Health IT System from the Middle Out, Journal of the American Medical Informatics Association Volume 16 Number 3 May / June 2009

³⁶ For information on developing a standards-based, public-private initiative here in Luxembourg it is possible to obtain guidance from XBRL Luxembourg. This group has recently proposed XML based standards to the financial reporting community (IT providers, public agencies, financial institutions) Please see <http://www.xbrl.org/lu/>

- i. **Provide public information on why interoperability is important** and a cost/benefit analysis of moving towards interoperability. Communication about national standards and regulations can improve the physicians' confidence in the electronic management of health information.
- j. Involve **local health care provider associations** (i.e. AMMD) in order to **communicate the benefits of certified systems** and to explain the process by which certification is achieved.
- k. **Monitor major projects abroad, European and cross border projects** in order to lobby to protect technology investment and to anticipate trends from foreign projects.

4.7. SYNTHESIS OF STRATEGIES TO OVERCOME ADOPTION BARRIERS

The below Table 4 develops a resume of general strategies to overcome the adoption barriers of an national EHR. The last two columns indicate the targeted project phase and the stakeholder for each possible barrier-related intervention strategies. We split the project timeline in 6 phases:

- C – Concept
- T – Test
- D – Development
- P – Pilot
- R – Roll out
- O – Operate

| Category | Health care provider Barriers | Technology provider Barriers | Possible barrier-related intervention strategies dedicated to: | HCP | TP |
|--|---|---|--|-------|------------|
| Finance | Start up and ongoing IT support costs | IT providers will only provide solutions for products & services that are profitable. Standards not widely adopted or in a small market increase the costs of doing business. | Provide documentation on return on investment. | C R O | D |
| | | | Show profitable examples from other EMR implementations. | C R O | |
| | | | Provide financial compensation. | P R O | D |
| | | | Incentives based on sliding scale (with measureable objectives) | R O | |
| Technical | Increased training requirements & IT platform questions | IT providers need technical input/resources from customers. New standards may increase the technical complexity of a system and raise questions about testing for compliance. | Educate physicians and support ongoing training. | R O | |
| | | | Adapt the system to existing practices. | | D |
| | | | Implement EHR on a module-by-module basis. | R O | D |
| | | | Link EHR with existing systems. | R O | D |
| | | | Promote and communicate reliability and availability of the system. | R O | |
| | | | Acquire third party for support during implementation. | | T D |
| | | | Develop a committee on interoperability to assess the current state of interoperability in the local market | | C |
| | | | Provide information and resources for the promotion of interoperability standards locally | | D |
| | | | Assess the costs and benefits of adopting one or more interoperability standards | | C |
| | | | Set up an on-going committee on adoption of standards and roadmap for future changes | | T D |
| | | | Identify areas for product certification and assess financial tools and criteria for assisting smaller vendors. | | C D P R |
| | | | Develop a certification program with IT providers and service providers | | P |
| | | | Assess financial and legal incentives for the adoption by health care providers or hospitals of certified software | P | P |
| | | | Provide public information on why interoperability is important | R | R |
| | | | Ask local health care provider associations to communicate about benefits of certified systems | R | R |
| Monitor European and cross border projects | | | | | |
| Time | Lost time due to training, work flow changes & fewer patients can be served | Changes in technical architecture may affect delivery of existing software to customers. | Provide support during implementation phase to convert records and assist. | P R O | P R O |
| | | | Provide training sessions to familiarize users. | P R O | |
| | | | Implement a user-friendly help function and help desk. | P R O | |
| | | | When possible, redesign workflows to achieve time gains | D | D |
| Psycho-logical | Loss of some control and lack of belief in EHR solutions | Health care providers more open to working with existing/known IT solutions. Companies need to be involved at the earliest possible stage when standards are involved. | Discuss usefulness of the EHR | C P R | |
| | | | Include trial period. | R | |
| | | | Demonstrate ease of use. | P | |
| | | | Start with voluntary use. | P | |
| | | | Let fellow physicians demonstrate the system. | R | |
| | | | Adapt system to current medical practice. | D | D |
| | | | Listen, understand and help stakeholder. | C | D |
| Discuss openly with all stakeholders the adoption of EHR | C->O | C->O | | | |

| Category | Health care provider Barriers | Technology provider Barriers | Possible barrier-related intervention strategies dedicated to: | HCP | TP |
|----------------|--|---|--|-------|------|
| Social | Unsure about reactions from colleagues and other stakeholders. Unsure of IT providers' capabilities. | In cases where the public may be implicated (PHR), information concerning privacy and general medical terminology/procedures becomes important. Changes in how people receive care can lead to adoption resistance. | Discuss advantages and disadvantages for doctors and patients. | C R O | |
| | | | Information and support from physicians who are already users. | R O | |
| | | | Ensure support, leadership, and communication from management | | |
| | | | Stimulate user and industry stakeholder | C P | T |
| | | | Stimulate interest and then elaborate on the need for adoption | P R | |
| | | | Give paper document collecting these success stories | R O | |
| | | | Publish papers in specific newspaper of actors | R O | |
| | | | Develop and communicate a "roadmap", be precise only for the 6 next months | C->O | C->O |
| | | | Present to public practical outcomes of use cases and pilot for utilizing public funds (General satisfaction, Clinical outcomes, Financial outcomes) | R O | |
| | | | Make occasional satisfaction study | P R O | |
| Legal | Privacy or security concerns | Impact analysis of legal issues necessary prior to launch of each project. Enforcement of standards compliance is of interest to IT providers and customers. | Develop requirements security in cooperation with physicians and patients. | C D | |
| | | | Ensure EHR system meets these requirements before implementation. | P | P |
| | | | Communicate on safety and security of issues. | R O | |
| | | | Inform on important legal and privacy issues. | R O | |
| Organization | Questions concerning the scope and scale of involved organizations. | IT providers need standards (interoperability & privacy) to develop new products/services. IT providers need one organization to manage transition issues related to standards and compliance. | Identify key areas for investment and focus on medical projects | C | |
| | | | Position your initiative in the healthcare landscape and share broadly your vision | C | |
| | | | Redesign workflow to realize a better organizational fit. | D | D |
| | | | Adapt EHR to organization type. | D | D |
| | | | Adapt EHR to type of medical practice | D | D |
| | | | Involve health care providers in the governance | C->O | |
| Change process | What leadership will be involved, what incentives are involved, who will participate? | IT providers need central authority to manage long-term projects. IT providers will need help with compliancy testing and certification. | Select a project champion, preferably an experienced physician. | P R | |
| | | | Let physicians (or representatives) participate during the implementation process. | P | |
| | | | Communicate the advantages for physicians. Use incentives. | P R O | |
| | | | Ensure support, leadership, and communication from management. | C->O | C->O |
| | | | Demonstrate the willingness of the government to accompany the user during the change. | P R O | |
| | | | Create a web site with a FAQ section. | P R O | |
| | | | Offer some training. | P R O | |

Table 4: Synthesis of barriers to the adoption of an eHealth program and strategies to overcome them.

5. CONCLUSIONS

Adoption of ICT in health care involves three key stakeholder groups. First, the end users of any HIT initiative who need to be made aware of all benefits envisioned under the proposed platform and who's feedback is critical to the success of the platform. The second group is the IT companies that will develop solutions according the expressed needs and standardsselected at the national level. By securing the participation of key members from each of these groups, working groups (regardless of the topic) will be able to better assess both the technical feasibility of different solutions and any local barriers to adoption. The last group is the patient, most of them will follow the advice of their Healthcare provider.

The above Table 4 provides an executive summary of the research barrier results faced by other countries and possible strategies to overcome the barriers of the categories described in the report. Recommendations for the promotion of eHealth programs are listed in the right hand column and have been broken down into eight categories for ease of comprehension.