Telecommunications standardization to strengthen research, development and innovation at CICESE Research Center: TS-CICESE

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DESCRIPTION

The pace of technology growth and the lack of a sound regulatory environment present important challenges to take full advantage of the new world scenario of digitalization and convergence. Emerging economies face the challenge to consolidating their standardization processes and policies to become relevant in this new scenario. Our project has the objective of creating an institutional standardization framework as a key strategy to strengthen the research, development and innovation efforts of CICESE Research Centre. We focus our proposal on the area of e-Health given the importance Mexico has placed in this discipline as a key enabler of socioeconomic development.

I.   Background Information

Since the last decade joint and independent efforts from the World Health Organization (WHO) and the International Telecommunications Union (ITU) have generated a series of recommendations to all countries regarding the integration of ICT in their national health information systems and health infrastructure [1], [2]. The aim is to support member states with vision and resources for the development or revitalization of their e-Health policies and strategies focusing on key emerging technologies such as mobile health (m-Health), telemedicine, e-Learning, management of patient information, legal frameworks, safety and security on the internet. Both WHO and ITU consider e-Health standardization and interoperability issues as fundamental components for accomplishing a sound national strategy on e-Health urging their member states to structure roadmaps for the implementation of health data standards and to ensure the compliance and adoption in public and private sectors [3].

Recognizing the existing disparity between developed and developing countries in standards   development matters, ITU has placed special attention to reducing this divide. In this regard, the program "Reducing the Standardization Gap" was established in 2009 [4]. One objective of this program is to identify and understand the gaps that inhibit the process of standards development and implementation in developing countries. At the same time, ITU acknowledges that the standards capability of a country represents a

significant element affecting the digital divide between developed and developing nations. The project "Telecommunications standardization to strengthen research, development and innovation at CICESE Research Center" is in line with the requirements and objectives of this ITU program.

II.   Goals and timeframe

The development, establishment and operation of our framework is an on-going project at CICESE Research Center. The project started in 2014 and it will be under operation and continual monitoring and assessment through 2016. This project is a joint effort of the Electronics and Telecommunications Division and the Innovation and Development Directorate. The following strategic goals have been set:

- Strengthen our academic membership at ITU

- Expand our current agreement with the Mexican Federal Institute of Telecommunications

- Strengthen our agreement with the Center of Excellence on Health Technologies from the Ministry of Health (CENETEC)

- Expand our program for "Fostering a Culture of Innovation at CICESE Research Center"

- Increase our participation in the Executive Board of the Chamber of Electronics, Telecommunications and Informatics Industry

- Expand the focus and activities of our Telecommunications and e-Health Standardization Research Group in our bi-national region (California-Baja California)

- Initiate in 2015 the standardization of one of our e-Health developments: The A-Prevenir system for diagnosis and prevention of chronic diseases in under-served communities.

III.   Project's added value and importance

With respect to the Mexican health sector, important efforts from government agencies have been placed to structure strategies and actions to increase the role of ICT in practically all the pieces of the value chain of the national e-Health ecosystem [5], [6], [7]. Furthermore, the ICT regulatory bodies had acknowledged the importance of standardization to advance the competitiveness indicators of the country and at the same time, the national health institutions recognize the need of standards that include ICT in their medical practices, delivery of services and equipment.

Mexico has a significant platform to enable a more comprehensive and focused participation in e-Health standards development. The strategies and current regulatory

structure of the health sector however, show an orientation towards meeting the needs of standardization of technology users. That is, there is not a focus on innovation and technology development to boost local participation in the creation of standards related to systems, processes and next generation medical devices (including m-Health). Although there is a substantial platform of standards covering different areas of medical practice, e-Health standards development requires concentrated strategies and actions in order to reducing the gap and improving the status of e-Health standardization in the country. But more importantly is the understanding and awareness on the part of the key actors of the Mexican health, ICT and regulatory environments of the complex and interdisciplinary nature of standardization and its crucial role in the global scenario.

IV.   Challenges

We identify three major challenges towards a comprehensive e-Health standardization framework:

a) The aspect of culture: Emerging economies face challenges in their efforts to increase the competitiveness and productivity indicators. As mentioned above, a sound standardization framework is a key factor for strengthening the national regulatory environment, providing at the same time, an opportunity for interaction of government and academia, working together, as in the case of Korea [8], in building a national "culture of standardization" permeating all strata of society. In order to develop this culture, a long-term vision with strategic, tactic and operational stages including the participation of all the stakeholders is necessary. Furthermore, reducing the standardization gap in a comprehensive manner calls for the adoption of an interdisciplinary approach.

b) Capacity Building: This factor becomes an essential element for the deployment of a comprehensive national standardization plan. This is particularly relevant for e-Health and related emerging disciplines. Academic institutions play a key role in the design and implementation of educational and training programs stressing the technical, legal and innovation issues involved.

c) Learning by doing: Allocation of funds to allow the participation of specialists in standardization working groups from ITU and other international agencies is a crucial factor to develop skills and practical knowledge in all the links of the value chain of e-Health. In many occasions, the lack of resources and a clear vision on the long-term nature of the learning process of standards creation limits the participation of professionals from emerging economies in special working groups and standardization committees.

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V.   Relevance of the project to the respective Action Line

The pressing need of improving the quality and coverage of medical services in developing countries, particularly in remote and under-served locations, represents an important opportunity to develop a comprehensive framework for e-Health standardization. We argue that this framework should consider an interdisciplinary and collaborative approach and that Mexican health and ICT regulatory bodies need to take into account the importance of the development of endemic e-Health standards rather than merely focusing on their use and implementation. Moreover, we also posit that the process of standards creation emerges from the interactions of the four subsystems forming the e-Health ecosystem. This ecosystem can be viewed as an open socio-technical-legal system. Figure 1 shows the four subsystems considered in our approach: The innovation subsystem, the national health subsystem, the sustainable development subsystem and the ICT subsystem.

We also believe that a sound e-Health standardization process requires strategic and integrated action at the national level, making use of existing capacity while providing a solid foundation for investment and innovation as suggested in the National e-Health Strategy Toolkit [2] developed jointly by WHO and ITU. Figure 2 shows the components of the National e-Health Strategy Toolkit identifying the critical steps in each one of its three stages.
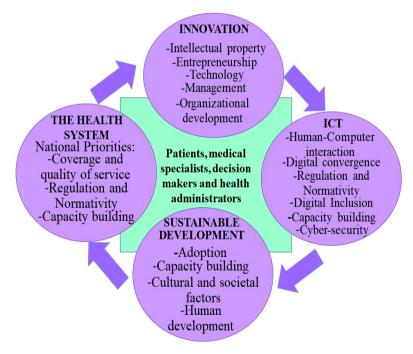

Figure1 Components of the e-Health Ecosystem.

- Manage the process
- Engage with stakeholders
- Establish the strategic context
- Learn from trends and experience
- Draft and initial vision
- Identify required components
- Gather information on the e-Health environment
- Assess opportunities and gaps
- Refine vision and develop recommendations

e-Health vision

e-Health monitoring and evaluation

e-Health action plan

- Define indicators for monitoring and evaluation
- Define baseline and target measures
- Define supporting governance and processes

- Manage the process
- Engage with stakeholders
- Develop e-Health actions lines
- Develop an integrated action plan
- Determine high-level resource requirements
- Apply funding constraints to refine plan
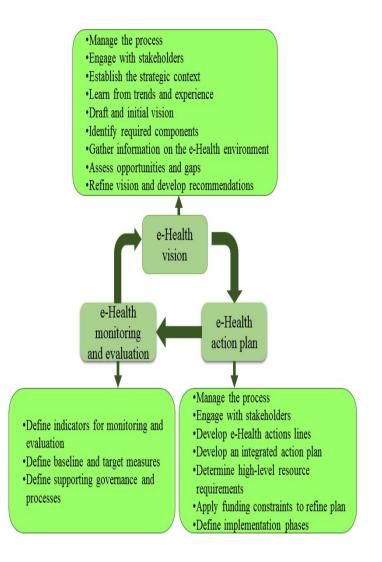- Define implementation phases

Figure 2 Toolkit for developing a National e-Health Strategy. (Adopted from [2]).

The National e-Health strategy for Mexico becomes the platform for the development of our project. In our view, a program for e-Health standardization should arise from a sound national strategic plan with participation of government, industry and academy stakeholders, including the key agents of the health sector: medical specialists, patients, health administrators and decision makers (see Figure 1). We propose concrete steps for the development of a framework for e-Health standardization; Figure 3 describes the elements of our approach.
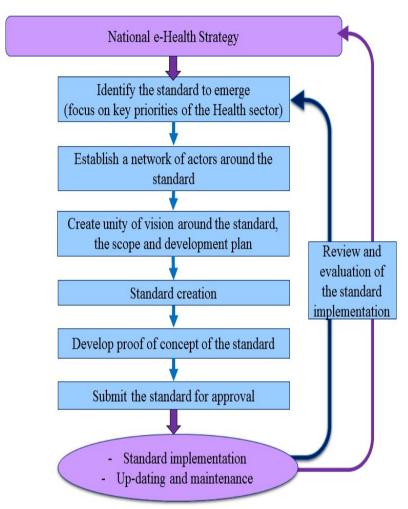
Figure 3 Elements of a framework for e-Health standardization.

We propose to initiate the process of e-Health standardization in emerging economics such as Mexico through the selection of one particular priority standard. It is important in this initial step to review and evaluate the current standard environment in order to identify priorities taking into account the standard creation capacities the local expertise and the unfolding needs of the health sector. The experiences gained in the implementation of this standard would allow to scaling higher levels of complexity including other standards and other requirements of the e-Health ecosystem as suggested in the Flexible Standards Strategy [9].

VI.   Conclusion

We identify major areas that should be addressed in order to improve the status of e-Health standardization in emerging economies such as Mexico:

- It is fundamental to establish a national e-Health policy emphasizing the crucial role of standardization in the value chain of medical processes and technologies. The framework for e-Health standardization would emerge as a key component of such national plan.
- Given the nature and dynamics of the e-Health ecosystem, the legal and ethical aspects of the framework become relevant and must be addressed.
- Capacity building and the establishment of a national program to permeate all levels of society are two critical aspects to foster a culture of standardization in the country [8].
- As suggested by WHO [10], the e-Health standardization framework should consider the following disciplines: Telemedicine, m-Health, e-Learning in health sciences for all the medical specialties, management of patient and medical infrastructure, as well as the legal and ethical elements involved.
- In order to fully capitalize interoperability, it is important to focus on the patients´ needs and interaction with data and technology. In this respect, patient education and the departure from a fragmented and technology centric perspective will be crucial to take advantage of the full potential of e-Health. Our approach of conceptualizing the e-Health ecosystem as a socio-technical-legal system would support the development of an integrated and a comprehensive national e-Health plan.

Without a comprehensive framework for e-Health in emerging economies, the role of ICT as a vehicle for socioeconomic development will be elusive and an important opportunity to participate in the definition and creation of standards of global impact will be lost. The experiences of emerging economies and developing countries in the provision of e-Health services in rural and under-served areas is very important, the development of a national standards framework for e-Health supported by all the regulatory agencies involved is viewed by the authors as a fundamental step in the transit toward the knowledge society. Rather than defining or recommending the development of a particular standard or set of standards, our aim in this project is to create a sound standardization platform for telecommunications and e-Health. We acknowledge the importance of the interactions of all the actors involved in the national telecommunications and e-Health ecosystem. The experiences gained in the operation of our standardization platform might be escalated to standards creation following the recommendations of both WHO and ITU.

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