

# **E-HEALTH: OVERCOMING THE MANY BORDERS IN HEALTHCARE**

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## ***Abstract***

*There are many borders that prevent the provision of quality and equitable healthcare. Regional borders limit the mobility of individuals and services, linguistic borders challenge mutual understanding, geographical borders limit the access to adequate care, and professional boundaries cause breakdowns in the continuity of the information chain. Although there are still significant challenges to overcome, the dematerialization of healthcare transactions and the automation of information processing provide useful solutions to these difficulties. These tools are illustrated by two projects: telemedicine and eHealth to support the mobility in the Alpine space (the ALIAS project), and distance support of isolated care professionals in Sub-Saharan Africa (the RAFT project).*

***Keywords – Portability, Interoperability, Electronic Medical Records, Telemedicine***

## **1. Borders in healthcare**

There are many obstacles to the provision of quality healthcare in our complex health systems. Borders of different kinds present significant challenges, but many of these can be addressed, at least in part, through the clever use of information and communication technologies and methods. This is, in essence, the rationale for eHealth and telemedicine.

This paper explores how different types of borders are hindering healthcare, and attempt to highlight how eHealth can provide solutions, through the examples and lessons learned of implemented projects.

### **1.1. National borders and limits to the mobility of individuals and services**

The variety of health systems between countries, and, in many cases, within countries, limits the portability of medical records and prescriptions, and, thus, complicates the mobility of patients across these borders. Legal and organizational frameworks are important to protect the privacy of patients and to structure the health systems. Therefore, their anchoring in the local societal context is essential. At the same time, there is a growing need to enable the mobility of individuals as well as the delocalization of healthcare services across national borders.

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Although the dematerialization of medical records, prescriptions, and other healthcare transactions can facilitate the mobility, several challenges must be met. First, a pre-requisite is the univocal identification of stakeholders, individuals, care professionals and care locations. Ideally, a legal framework, derived from the national health and eHealth strategy, should formalize the often delicate balance between privacy protection, the autonomy of individuals and care professionals, and the needs for more transparency. Then, a trusted environment can be created, taking into account the different legal and organizational requirements. In general, the consent of the individuals must be obtained explicitly and documented formally.

In addition, the eHealth tools should be designed to maximize the ability of computer-based tools to meaningfully process information, rather than just moving documents around. This implies the use and development of interoperability standards, as well as a significant effort to characterize, normalize and annotate data with semantic metadata.

## **1. 2. Linguistic borders and the difficulties of mutual understanding**

Linguistic borders, between and within countries, pose significant problems to ensure the mutual understanding between the stakeholders, and minor errors in the transmission of information can have devastating effects when dealing with the health of individuals.

Although automated translation of natural language has made significant progress, it has yet to reach the required level of reliability. Other approaches, based on structured and semi-structured documents, are necessary: encoded data sets can be mapped to common terminologies for which validated translations exist. This is particularly the case for key information such as medications, allergies, diagnoses and procedures. The maintenance of coherent terminologies and their translations remains a challenge. At the same time, free text is essential to insure an appropriate level of expressiveness and will remain a significant source of clinically-relevant information.

## **1. 3. Geographical borders and barriers to access to adequate care**

Even though this is truer in developing countries, most healthcare systems experience significant imbalances for the access to adequate care: there are medical deserts even in the countries where the density of care professionals is high. Typically, physicians and in particular specialists tend to aggregate in the main cities, deserting more distant healthcare structures. Although the centralization of certain medical specialties is both necessary and desirable, the inadequate distribution of care professionals can hinder the development of much needed health promotion activities and of quality proximity care.

The dematerialization and transmission of expertise, without having to move either the patient or the care professional, can significantly improve access to adequate care. Convincing examples include teleradiology [5], tele-stroke units [1] and tele-psychiatry [4] consultations and treatments.

## **1. 4. Professional borders and the discontinuity of care**

A less visible border relates to the multidisciplinary and complex nature of healthcare processes, leading to breakdowns in the transmission of information, and to the discontinuity of the information chain that supports healthcare processes.

## 2. Access to remote expertise and medical records: the ALIAS project

Funded by the regional development funds of the European Commission for the Alpine Space, the ALIAS project [6] aims at solving problems that are common to most Alpine areas for healthcare delivery: how to provide expertise and relevant medical information to remote healthcare facilities in the mountains, and/or to support the care of patients that move within the Alpine Space, for work or for tourism. It therefore deals with several of the difficulties highlighted above: the multinational, multilingual and potentially isolated environment.

The ALIAS project is aimed at delivering and piloting telemedicine-related services. The information provision service allows healthcare professionals of any ALIAS hospital to access information about a patient coming from any (other) ALIAS region, upon his/her consent. The advice query service allows any healthcare professional of the ALIAS hospital network to use live or asynchronous telemedicine tools to require expert advice on a patient for a diagnosis, treatment or management decision.

Challenges for this project are of various kinds. The first one is to establish a common framework of reciprocal trust in which each of the participant accepts ground rules related to security and privacy protection, in order to make sure that the transfer of clinical information is safe. This “Circle of Trust” (Figure 1.) includes technical aspects, but relies mostly on contractual agreements which explicit the responsibilities of the participants, and, in particular, the mechanisms for obtaining and documenting the patient’s informed consent for such medical data exchange. This project is not about developing new tools, but rather connecting existing ones into a “network of networks”, using a “Connector” (Figure 1.) whose role is to normalize the conversation and messages between the existing “local systems” and the ALIAS platform. Services of the ALIAS platform include translation tools for the exchanged documents, for structured information such as medications names, or for free text.

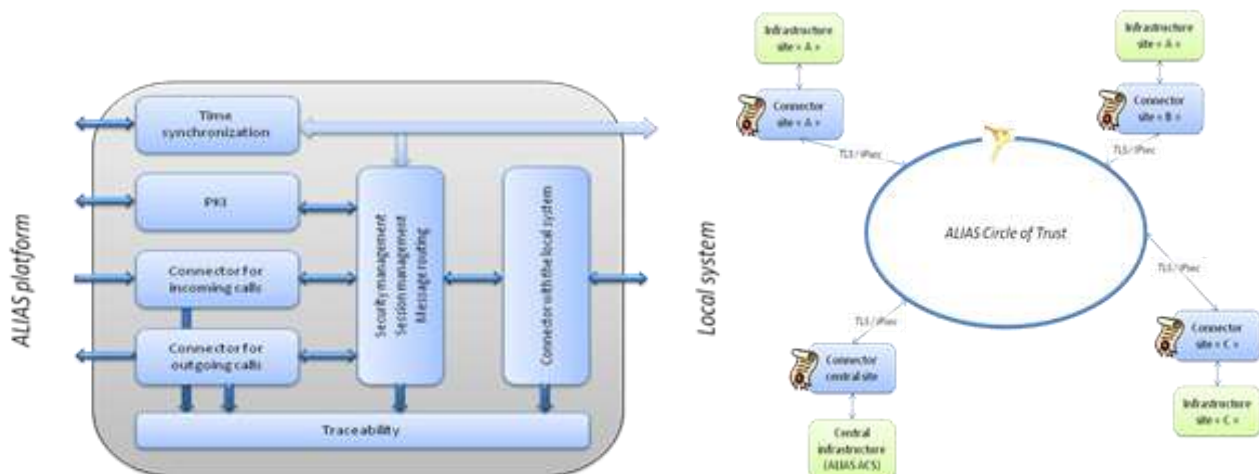


Figure 1: The Circle of Trust (left) defines a homogeneous technical, organizational and legal environment for sharing medical information. The connector (right) handles the security, communication and normalization of transactions between the local systems and the Circle of Trust.

## 3. De-isolating care professionals: the RAFT network

Continuing education of healthcare professionals and access to specialized advice are keys for the quality and efficiency of a health system. In developing countries, these activities are usually limited to the main cities, and delocalized professionals do not have access to such opportunities, or

even to didactic material adapted to their needs. This limits the interest of such professionals to remain active in the periphery, where they are most needed to implement effective strategies for prevention and first-line healthcare.

In order to address these needs, the Geneva University Hospitals have developed a telemedicine network active in Africa since 2001 (the RAFT, Réseau en Afrique Francophone pour la Télé-médecine [3,7]), first in Mali, then in Mauritania, Morocco, Cameroon, and, since 2004, in Burkina-Faso, Senegal, Tunisia, Ivory Coast, Madagascar, Niger, Burundi, Congo-Brazzaville, Algeria, Chad, Guinea, and Benin.

The core activity of the RAFT is the webcasting of interactive courses targeted to physicians and other care professionals, the topics being proposed by the partners of the network. Courses are webcast every week, freely available, and followed by hundreds of professionals who can interact directly with the teacher. Most of these courses are now produced and webcast by experts in Africa. A bandwidth of 30 kbits/second, the speed of an analog modem, is sufficient, and enables the participation from remote hospitals or even cybercafés.

Other activities of the RAFT network include teleconsultations, tele-echography [2], and collaborative development of educational on-line material. For example, general practitioners and mid-wives can be trained, in two weeks, for the use of portable ultrasound imaging tools, and then, can count on the remote supervision of radiologists to validate their echographic diagnoses done in remote, rural hospitals. Diagnostic concordance of 95% between the care professional and the radiologist is achieved within two months. This enables a better management of obstetrical and abdominal problems, helping remote physicians to decide whether a patient can be treated locally or should be evacuated, frequently over long distances and at high costs, to a reference hospital.

Active in 60 hospitals throughout Africa, the network is currently organized and run by more than 30 national coordinators, supported by a small coordination team based in Geneva. In each of the partner countries, the RAFT activities are supervised by the focal point, a university professor who links the project to the national governmental agencies (ministry of health, ministry of education). A local medical coordinator (a more junior physician) and a technical coordinator take care of the day-to-day operations, including communication with the care professionals, identification of training needs, technical training and support of the various sites within the country.

The current priority is the large-scale deployment of these telemedicine tools along with IT-enabled diagnostic devices, to the regional and district hospitals in Africa. These infrastructures could also be used to facilitate public health activities including the collection and communication of surveillance and healthcare indicators to the ministries. The usefulness of these tools to support isolated care professionals has been demonstrated, as well as the sustainability of the implementation in large hospitals who can integrate the recurring connection costs in their operational budgets. Given the high costs of satellite connections, which are the only options in remote areas, it has been evaluated that sustainability can currently be achieved down to the district-level hospitals who usually serve populations of 50'000 to 200'000, and operate as the first level of reference for dispensaries and rural hospitals.



**Figure 2:** A remote hospital in rural Mali (left), de-isolated thanks to a satellite connection, can benefit from continuing education, access to remote expertise, improved logistics through the coordination with other hospitals and pharmacies. Dr Traoré (right), equipped with robust, low-tech, solar-powered computer systems, has been active in this hospital for 5 years, developing preventative activities, sanitation, vaccinations, improved access of pregnant women to medical assistance. He recently completed a university degree in epidemiology, through distance learning.

#### 4. Conclusion

The dematerialization of healthcare transactions and the automation of information processing provide useful solutions to overcoming healthcare challenges posed by the many borders in our complex, multinational and multilingual health systems. They facilitate the mobility of individuals and services, and improve the access to adapted and quality services by making expertise available even in remote areas. Challenges in developed countries relate mostly to interoperability issues as well as the creation of trusted spaces in which distance transactions can take place securely and with the necessary protection of the privacy of individuals. Additional challenges in developing countries include access to internet connectivity and the availability of trained professionals.

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