Cross-Frontier Information Provision in the ALIAS European Project

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Abstract. The ALIAS project addresses medical services and information inadequacy to ensure healthcare provisions in Alpine space where telemedicine services are not widely exploited and linguistic barriers represent an obstacle. Alpine space touristic vocation makes its healthcare structures periodically inadequate to face a widened request of services supply. On the other hand, a major receptivity of those structures during the rest of the year is unnecessary due to the low density of local residents. ALIAS is aimed at linking together a number of hospitals enabling the creation of a network shaping the ALIAS Virtual Hospital Network for sharing medical information and adopting telemedicine services to improve the efficiency of hospitals in Alpine Space areas. This article focuses on the clinical information provision service provided in ALIAS and on the translation service that has been associated to it.

Keywords. eHealth, hospital network, clinical information provision, information translation

1. Introduction

Mountain territories have specific characteristics that have an impact on the health strategies that should be set up to improve quality of care in such regions. Among them, we can cite: the scarcity of local residence and the particular ageing residents rate, the huge invasion of tourists during short periods and the difficulties of transportation of people with a more acute importance in winter. This has to be associated to the prevalence of some specific diseases like chronic obstructive pulmonary disease or trauma accidents and also to the desertification of local health practitioners.

Information and Communication Technologies and eHealth should bring answers to such characteristics. More and more hospitals, regions or countries have an electronic patient record management system (EPRS) for their citizens. Practitioners from a region then get access to their regional system. But when the patient requires care outside the region, the local practitioner cannot access to the corresponding EPRS.

The Alpine Hospitals Networking for Improved Access to Telemedicine Services (ALIAS) project [1, 2] started in August 2009 for 3 years. It is a pilot project involving the Alpine territories of six European countries in the experimentation of a new model of cooperation among hospitals, aimed at issuing services to residents as well as

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citizens requesting healthcare assistance in the involved areas. Using eHealth technologies, the ALIAS project links together participating hospitals in order to facilitate the cooperation among healthcare professionals to foster the exchange of knowledge. It improves the ability to diagnose and therapy in a cross-border context.

After a rapid presentation of the ALIAS project services and virtual hospital network, we focus the article on the information provision service and its associated translation service. We will show how we have built in a very short period a system that allows communication without imposing standardization of regional EPRS.

2. The ALIAS project

The ALIAS Project originates from telemedicine and electronic health record initiatives which are already underway in the territories involved and complies to the different data security, privacy and protection regulations of the countries participating in the initiative. From a technical point of view, ALIAS is a shared platform which allows hospitals to connect with the ALIAS central service (ACS) to access information, share professional expertise and knowledge. The ALIAS project intends to deliver and pilot two telemedicine-related services:

- **teleconsulting** through which citizens can access specialist medical counsel, enhancing the professional profile of the involved healthcare centres thanks to online collaboration with the wards of the best hospitals and centres of excellence in the network, working jointly on complex clinical cases, with the goal of improving the quality of treatments,
- **clinical information provision** aims at improving the accessibility and quality of hospital services and clinical practice. This is achieved through a better use, over territories, of already existing information. Accessing patients' clinical information from any hospital of the network has the main objective of improving citizens' wellbeing.

The ALIAS Virtual Hospital Network (VHN) is composed of hospitals and specialized diagnostic centers. Initially formed by eight hospitals, it will expand to include new nodes in the future. ALIAS services will be piloted within the VHN. ALIAS pilot sites are the Varese Hospital in Lombardy, the Tolmezzo Hospital in Friuli Venezia Giulia, the Garmisch-Partenkirchen Hospital in Oberbayern, the Grenoble Hospital in Rhône-Alpes, the Bolnisnica Golnik Hospital and the Splosna Bolnisnica Izola Hospital in Slovenia, the Landeskrankenhaus Villach Hospital in Carinthia and the Hôpitaux Universitaires de Genève in Région Lémanique.

3. Clinical Information Provision in ALIAS

3.1. Interconnecting Existing Electronic Health Record Management Systems

In the following, we focus on the clinical information provision service. A scenario that can be sketched is the case of a patient from region R looking for care in region S. For example, a citizen of Lombardia on holidays in a Rhône-Alps ski resort gets a serious

heart problem that requires immediate care. The region S physician who takes this patient in charge requires clinical information on the patient but they are stored in the EPRS of region R. Today such a provision of information is not possible, as physician of region S is not known by the region R EPRS.

The ALIAS clinical information provision service permits this scenario to occur. We have designed and implemented the ACS that allows building a circle of trust among the virtual hospital network partners [3]. The ACS defines principles to authenticate the physician and then to grant him access to the entire circle of trust, to identify the patient, to check that the patient consent is acquired, to provide the patient EPR to the physician and to propose a partial translation of opened documents in the physician's language. All these steps have been defined in accordance with the legal framework of all participating countries.

Participating hospitals all have their own EPRS. Each EPRS has been structured in a specific way so that the content and organization of clinical information is very different from one EPRS to the other. The common point of all these EPRS is the use of pdf documents. Most of them also use the IHE PDQ and XDS standards for documents exchange. Few EPRS do not offer an automatic way to provide documents. According to the regional EPRS capabilities, the provision of clinical information is of two kinds. Some queries will be automatically treated and instantaneously replied by the concerned regional EPRS. Queries to regional EPRS that cannot be automatically treated send a kind of secured e-mail to a corresponding physician in the regional partnering hospital who will select and/or build documents to send on reply. The set and structure of answered documents is not standardized within the partnership, so that no intrusion is done in the local EPRS. This choice has the double advantage to be rapidly efficient and not to interfere with local legal, social and political aspects of EPR.

The patient consent is obviously required before any document provision. It is formalized by a written and signed document provided in the two languages of the patient and the physician. This consent has been specifically written for ALIAS.

3.2. Multilinguism

Information exchanged with the clinical information provision service comes from the different partners EPRS, written in the language of the country. Images are quite international, but the practitioner who receives a full-text document may not know its language. Moreover, some drugs brand names are local to a country, as authorizations for drugs are made at the national level. To enhance information exchange, a computerbased service is required to help understand documents written in a foreign country.

In the medical domain, precise information translation is unavoidable: mistakes in translation could induce danger for patients' health and is thus not acceptable. Full-text automatic translation proposals one can find in the literature or on the Web do not ensure precise translation of full text [4, 5]. Everybody knows for example the Google Translate [6] online service that can be used for approximate translation of short texts, but obviously not for medical documents. Privacy concerns are also a strong barrier to the use of already existing online services. Moreover, medical documents are official traces of procedures and results, they cannot be modified without consequences; the original document must be the reference. We have thus designed a translation service that has the following characteristics:

- A **precise but incomplete translation** of documents: only precisely identified terms are translated. As documents come from heterogeneous existing information systems, no hypothesis is made on the document structure. Its format is most often pdf, but we also manage text and rtf documents.
- The original document is presented to the reader with translation annotations. No modifications are made on the document. Bullets are set onto the document at the place where terms have been identified. They can be opened to get the translation of the concerned term.
- **Diseases and Drugs** are concerned by translation. The most important information in documents is the list of drugs taken by the patient, and his/her known diseases. As standard classifications and databases exist for diseases and drugs, they are also precisely identifiable in full text documents.
- Translation is **optional**, the practitioner clicks on a dedicated button to activate translation.

Translation of diseases is based on the ICD-9 and ICD-10 International Classifications of Diseases [7]. It is available is all the languages used by the ALIAS partners, i.e. French, German, Italian and Slovenian. "Translation" of drugs is more complicated. Translation is not the right term in this case: the objective is to provide equivalences between national drugs. National databanks provide drugs with their brand name and active components as a list of codes, standardized by the Anatomical Therapeutical Codes (ATC) [8]. Level 5 ATC encodes chemical substances. In our service, drugs are equivalent is they have exactly the same ATC codes list at level 5. Annotations provide the level 5 and level 4 (therapeutic class) labels for each molecule in the drug. Figure 1 shows a snapshot of an annotated Italian document. An annotation is open and provides the French translation of a drug. This translation gives the ATC code and label at level 5, the ATC label at level 4, and the equivalent drugs names found in the French national databank.



Figure 1. Snapshot of the French annotation of an Italian document.

We have developed a disease translation module and drugs equivalence module. They form a Web Service that is available within the ACS circle of trust. The translation of a document is made at request. The process for documents translation is the following. The document region allows selecting the ICD language and the adequate drugs databank. Using the GATE [9] morpho-syntactic text analysis tool, diseases and drugs are identified in the document. Using our translation modules, annotations of diseases and drugs are created. The user interface of our service places bullets on the document. A click on a bullet makes the corresponding annotation appear.

The GATE tool is a global architecture for text engineering. It requires as entry dictionaries under the form of OWL ontologies. The transformation of ICD, ATC and

national drugs to the required format has been done. This transformation results in very large ontologies that require the GATE enhanced ontologies management module called Gazetteer LKB.

4. Conclusion

Today three partners have connected their local systems to the ACS. In June 2011, the other five participating hospitals will also be connected. A piloting and assessment phase will be launched for one year to evaluate the practical application of the VHN.

In the ALIAS project, we are building a rapidly operational solution, and thus the diversity of the today operational platforms is a prerequisite. Information provision is not standardized: each platform provides the information as it is created at source. Nevertheless, the ALIAS platform ensures a uniform way to access information. The additional translation service fosters the accessibility of information written in exchanged documents. Improvements of the translation services are expected by end 2011. The objective is to enhance this service by identifying contextual information that would improve the document understanding. The piloting phase of ALIAS will allow getting a consequent feedback, both on the service and its user interactivity.

Acknowledgments. This work is supported by the European Alpine Space Programme, under



the project ref 4-2-2-IT. We thank all the partners included in this project: the General Directorate for Health of Lombardy in Italy, the Healthcare Regional Agency of Friuli Venezia Giulia in Italy, the Garmisch-Partenkirchen Hospital in Germany, the French Rhône-Alps Healthcare Information System, the French

Université de Lyon, LIRIS CNRS UMR5205, INSA-Lyon, the General Hospital Izola in Slovenia, the University Clinic of Pulmonary and Allergic Diseases of Golnik in Slovenia, the Regional Hospital Villach in Austria, the Geneva University Hospitals in Switzerland and the Republic and Canton of Geneva, Department of economy and health in Switzerland. We also thank the public healthcare authorities working as observers: the Bavarian Health Ministry, the Carinthia Government, the Austrian Ministry of Research and the Rhône-Alps Regional Council.

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