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Shared Patient Records Networks in Open Source

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Abstract

Implementation of a patient centered health care model in order to support collaborative work between all the care providers in charge of the same patient; shared patient records in regional secured networks; coordination role of the family doctor; a regional network at the primary care level not exclusively linked to any hospital; Open Source approach in order to stimulate exchanges of ideas and reuse of good components between developers.

1. Introduction

The global objective is to support more collaborative work between all care providers in charge of the same patient. The approaches are based on shared records on regional servers and on Open Source.

This paper gives a description of the choices made up to now in the CRISNET project and introduces a discussion about the next phases of developments.

2. Medical aspects

For the latest 40 years the trend in health care has been to develop more and more specialisations. This did of course bring very good improvements, but the coordination has been a little forgotten. Today the care of one patient requires usually the participation of a team of several care providers, having specific profiles.

Key issues of the project are:

- Particular attention to the global coordination of the patient's health and to the long term continuity. Who is qualified and who is actually motivated to cope with these issues? Mainly the family doctor at the primary care level.
- The maintenance at any time of a comprehensive synthesis of the "Problem List" of the patient. This is important for the patient because the members of the care team need a common up to date overview of the situation, whatever their particular specialties may be.

  Moreover new members of the care team may become necessary at any time, for example if the patient would need care in the emergency department of a hospital where he is not yet at all previously known.

  The "Problem List" must contain an entry for every relevant "Health Issue",

including summaries of current active problems, past history and risk factors. As far as a problem requires some activity, a link toward the related item(s) of the Care Plan must appear.

- The maintenance of the "Care Plan", including as possible all the current prescriptions having been given to the patient by different colleagues in the care team, information which is often difficult to find.

  More generally speaking the Care Plan is a table containing a comprehensive overview of all "Services Requests", including not only prescriptions but any kinds of Orders like e.g. a pending lab test requests, an appointments by a specialists, a registration in some waiting list, done and planned vaccinations, etc...
- This "Virtual Care team" is a well defined small group of care providers needing to share the patient record, including the GP, and when necessary specialists, as well paramedical collaborators in the scope of multidisciplinary Integrated Care and according to a mandate given by the patient.
- A very detailed management of the access rights has been designed and is already implemented to some extend. This allows providing access to only the right documents, at the right time, for the right persons needing that information for the care of the patient.

  The rules need here to take account of the confidentiality of the patients as well between doctors.

3. UML Model

A generic UML model has been defined, from the point of view of the coordination of the patient's health. It is a simplified field implementation of the project "GEHR" from UK and the "DPRS-2" in Belgium.

A few aspects will be presented:

- The derivations between the classes about User, Groups, HealthCare providers, Patient,
- A broad approach to the notion of Health Issues, including the "Reasons for Encounter", as well "Risk Factors" intended to encompass the follow up of preventive medicine activities,
- The chapter about the workflow of "Services" is currently being extended although many questions remain still in discussion, trying to keep a generic approach. The considered scenario includes the navigation between the key concepts.

  The scenario is seen as a continuous "iterative" process, regardless of the current location of the patient at home, by the GP or in some hospital.
  - The start point is usually some Observed Facts requiring attention and recorded here "as is" without interpretation.
  - Assessments on these Observations are made by a doctor, i.e. the identification and formulation of one or several "Health Issues", which may become "diagnoses" after a while.
  - In answer to these Problems one or several "Request for Services" are initiated, including information about the Objective of the Request.
  - Theses Requests for Services are processed, what it may be (a consultation, a lab test, a request for specialist advice, a treatment, an admission, etc....). The end Results of the Requests, again of what type what it may be, are archived as Observed Facts.

– The new set of Observations can lead to new assessments and to start the next iteration of the care process.

This next iteration must be seen in the scope of the Care Team and indeed maybe across several different care providers and organizations.

4. Software

The main philosophy is to share information on-line directly on very secured regional servers.

However, short "notifications" can be "pushed" to another partner in the Care team, in order to draw his attention immediately, on some location in the shared patient record in the regional data base.

Communications are encrypted and all users are authenticated by means of asymmetric keys, from the Medical Order or from Certipost.

The network architecture has been designed in a very modular way, from the presentation layer to the database layer.

Every layer is made autonomous, as far as possible, with formal interfaces, in such a way that a layer could be replaced without modification of the other levels.

The modular approach is very important because the CRISNET project is essentially a ***communication platform*** between various existing computer systems.

A "transaction engine" allows invoking components which could have been created and maintained by other development centers. This can be achieved by means of simple XML-RPC.

Most modules are currently written in PHP, but integrations with modules in other Object Oriented languages are foreseen, particularly Python, C++, Java…

Presentations may be adapted without changing the underlying logical level. Various kinds of presentations include screen views, printouts, as well specific formats like e.g. KMEHR, "Kindly marked Electronic Health Record", a representation looking as a kind of HL7 like XML currently implemented in Belgium.

Specific screen layouts of the same shared common information, can be relatively easily adapted to the preferences of different target user groups, as GP, specialists, nurses, as well the patient himself looking at his own Care Plan, etc...

All modules are made with a multi-platform compatibility (MS, MAC, LINUX) at the client side.

Behind a formal interface, information can be interfaced with various database systems, as e.g. currently Postgres, Oracle, etc..., and including an interface with the planned Belgian national health care index network ("S3").

5. Open Source

Trying to improve collaborative work between doctors is already a difficult challenge. We need to be able to share information across various medical organizations where the users have much different and incompatible proprietary software.

Trying to improve collaboration between informatics people may be an even bigger challenge. Indeed it should be no more necessary to continue to create new projects again and again, completely from scratch.

For these reasons, "Open source" did become the preferred approach, with 2 economic aspects:

5.1 Development

Most medical organizations want of course to have good software well adapted to their needs, but in general they do not mind to remain the owners of software licenses. Far more critical issues about health care software are the long term continuity, the reliability and the availability of new improved versions every few months.

Since a lot of local cultural difference will continue to exist, the best approach is very modular. If you find software components good for you, you may reuse them. If not, you have to make what you are missing by your own resources, and to publish them again in the pubic domain.

After a few years this is expected to end naturally in a situation with a small number of preferred solutions, far less than the current number of proprietary medical record software. But please not freeze one unique “ideal standard”, in order to keep openness for new ideas.

To make software components in a generic way may cost in begin some more efforts, but at the end Open Source software is relatively inexpensive, when used and reused in a large community. However, a minimum of resource is in any case necessary.

The practical question is to find enough organizations willing to support Open Source developments.

* Foundations? because the achieved results of their donations will be multiplied by the openness.

* Public authorities? because they have the responsibility to make good health care available for every citizen. They spent already a lot of public tax payer money for that goal. In most countries, significant public budgets are available for improvement of the national health care system, but why should they continue to result in proprietary software?

5.2 Exploitation

The users must share the costs of exploitation, including all IT services necessary for equipments, installations, maintenance, training, quality control, etc... Most users understand very well and accept to support that kind of costs.

Exploitation in Open Source may be provided as well by local user's organizations as well by commercial service providers, not having to take risks in investments related to software developments.

CRISNET 'asbl' is an independent non profit GP organization, based in Belgium.

6. Results and current Implementations

For 2 years a first CRISNET server is operational in a medical center near Charleroi. The initial version is still very simple but 40 doctors are already working completely paperless.

The server is located in a professional computer room, located in medical premises, as recommended by the Belgian Medical Council. The server is a common regional service, managed by a GP association and independent of the surrounding hospitals.

In a few minutes a short life demo could be presented during the conference, either wireless or through a faster access to Internet.

Since this is an Open Source software, a similar server is yet already operational in Kinshasa, on request of Congolese colleagues.

7. References

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HXP: http://hxp.sourceforge.net/author.html

More information on the CRISNET web site at http://www.crisnet.be/

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