

# Healthcloud & Crowdsourcing

Ferrer-Roca O. MD PhD

**Abstract**—Modernization of Health care in an economical constrain environment require to put into practice two initiatives: Healthcloud and Crowdsourcing. For most medical people none of the items are known, bringing the evidence that doctor training is lacking modernization. In the present paper we will explain why both initiatives are require and what are the main items one should know to implement it in the Health Care environment.

**Index Terms**—Cloud, healthcloud, crowdsourcing, modern medicine.

**Abstract**—La modernizacion de la atencion sanitaria en un entorno de recession economica pasa por implementar soluciones de Sanidad en la Nube y Ayuda de la tribu, es lo que en ingles llamariamos Healthcloud y Crowdsourcing. Para la mayoría de los médicos estos términos le son totalmente desconocidos, lo que es un indicativo de que la formación medica recesita una urgentísima renovación. En este articulo, vamos a explicar ambas actividades y cuales son los conocimientos minimos que los médicos debe saber sobre ellas para demandar la implementación de estas soluciones en el entorno sanitario.

**Index Terms**—La Nube, Sanidad en la nube, Ayuda tribal, consultoria masiva, medicina moderna.

## I. INTRODUCTION

THE consumer is changing his habits. The present crisis is changing the world and this includes “No matter who you are, most of the smartest people work for someone else” 1990 Jog. **Crowdsourcing** is not new, most of the people have been taking advantage of others experience, the new thing is that is now organized and established through Internet, allowing people that you do not know to help you. We are talking of the “*Talent democratization*”, through Internet you are able to get help from the most knowledgeable person in the world and this is done with much low price. It is in fact a way of outsourcing the only difference being that people in charge of helping is not one person, but a *group of very talent person*. **Jeff Howe**, published the concept in 2006 in *Wired* referring the assignment of tasks to the community (“crowd”) through an open call.. Latter on **Henk van Ess** extended in his Lecture in September 2010 the definition towards how to find a crowd: “*the crowdsourcing canalized the knowledge and desire of experts to solve a problem sharing the response*”

Manuscript received December 10, 2011.

OFR. UNESCO chair of Telemedicine. Full Professor of Pathology. University of La Laguna. 38400. Tenerife. Canary Islands. Spain. (phone: +34-922-642015; fax:+34-922-641855; e-mail: catai@teide.net)

with everyone” whether this will be for free or paid is a matter of desire. There are many types of crowdsourcing: politic, social, industrial, technologic, creative... To canalize a massive response Internet is ideal. Internet has a series of advantages, no travel is required, interaction is much more dynamic and therefore efficiency is highly incremented. In many cases crowdsourcing solutions have been based on charity, but also in costumer proposals (what do you want, what is the budget, time table...) with response of a variety of professionals that might be interested in those conditions. In fact some crowdsourcing site is just a wall to post demands that ask for a crowd-source solution paid or not paid. Is not anymore the “global village” is in fact the “**global tribe**”. The global tribe is serving the individuals. It is like an auction, you offer and you get responses. This is similar to “e-bay”, but facing another philosophy. This is taken now a day as the most modern business system capable to renew completely the market offers building. Considering that apart from charity, user is going to pay in advance, it is require to be built inside of a very serious commercial environment to give confidence to the client.

To put an example, there are no many experts in the real implementation of Health 4.0 applications in health care. Under those premises a solid enterprise that allows solutions to the clients with experts all over the world might have a niche of business.

## II. CLOUD VERSUS GRID

### A. Health cloud



There is a fact that most people do not distinguish between CLOUD and GRID. Superficially one is referred to the Cloud as a virtualization process and the Grid as a direct work. Grid environment is ideal when large computation

power is required for just one application. Whereas virtualization is ideal in simultaneous use of a large number of applications that individually consume a very low computation. In the CLOUD no one is aware of whether underneath there is a grid or a virtualization process, the only thing important is to put the application to work in the Cloud and the Cloud itself will be intelligent to find out the resources required for it. That means that we are moving from great virtualization to great management. We do not care anymore of were the cloud is private, public, mix or whether the cloud have various infrastructures ( Microsoft, linux, IBM...)

The Cloud crossover the virtualization architecture, the Grid, the SaaS, the PaaS etc... All of them can run simultaneously, the Cloud is built with whatever blocks are considered the best for a task demanded.

On the other hand the **personal Cloud** or **pCLOUD** is in the field of mobile health and integrates the iPhone app, Google app including Google Health, and any application running somewhere to solve a personal health problem using Internet.

If we trust the Google predictions, the situation will be as follows:

- In 2019 parallel computing will be 50-100 times more powerful.
- New sensors will send and receive data from the Cloud.
- Crowd... whatever (crowdsourcing, crowdfunding, crowdlearning, crowdepidemiology..) All systems will have the opportunity to learn from each other and from people behind the systems.
- Medical and Scientific researchers will access massive data sets to get information from their analysis and pattern behavior. (data mining)

On this environment "**HealthCloud** is a must" (should be a secure area in the Cloud) to access any type of information (ie: laboratory data, x-rays, images etc.. ) but also any type of sensor or organic information allowing to answer questions that up-to-now have been impossible to solve. It will be *Intelligent prescriptions* that will bring patients to closest pharmacy, and the *Healthy smartphones* will be a demand to query a diagnosis from an image, make an spectral data analysis, quantify blood specimens etc...

#### B. Cloud telephony

**Cloud telephony** is already a reality. An extensive number of services are available for the user to optimize their resources such as:

- IVR (interactive voice response).
- CATI (computer assisted telephone interviewing)
- ACTI (automatic assisted telephone interviewing)

All of them services capable to help Health Ministries to analyze user satisfaction, waiting lists etc... that can be analyze automatically in more than 20 formats Access, ASCII, dBase, Excel, SAS y SPSS.

#### C. Medical Cloudware

Now let us imagine how could be the HealthCloud if this is centralized in the Ministry of Health. It will be very easy for all hospitals national wide, almost no management, all applications compatible. Think of it.

We specifically address the Ministry of Health to hold the National wide cloud, because security in the Cloud is not

enough for health, although we have to watch what Obama will build to see if we can address the issue as in the States.

Pure science fiction since health competencies are all transferred; to achieve that goal the Ministry of Health should be winning community by community the right to handle the a Spanish common health-cloud. I will be in favor if I were a politician.

#### D. Cloud Infrastructure

Now a day people are concentrated in the next level of virtualization in which businesses are mainly focus in their applications assuming to be fully connective.

For that we require the special Cloud Infrastructures. That is the reason why Microsoft called their Cloud infrastructure "system center". It is an infrastructure that supports any applications, the ability to scale it and to meet the demands without taking care of them (management free) in an overall economic basis.

First of all, to be able to cross from private to public and hybrid clouds **4 communalities** are essential to run the products at Internet scale:

- 1) **Identity**, you move the ID all over the cloud
- 2) **Virtualization**, you move virtual machines from public to private and vice versa, to "get rid-off infrastructure".
- 3) **Application development models and frameworks** to deploy either in public or private, maybe the data is in a private cloud but the facing is in a public cloud.
- 4) **Management**. It is a common management in private, public or even other service providers. Repetitive task are automatized and one can focus on strategic tasks. The key issue of cloud is "get rid-off management", particularly in big organizations.

To start a cloud one need: 1) To scale the infrastructure to meet the needs of your applications. 2) Find a strategy in the cloud that meets the requirements.

We are talking of fabrics and a management framework that can manage that fabric as a single entity.

**Fabrics** means the infrastructure required in a switched fiber channel (2 unidirectional fibers in opposite directions). This are switch fabrics providing a fixed configuration, sometimes slightly modular and with no redundancies.

The result of adopting cloud is about predictability and simplicity and reduce complexity and price maintenance (1/16 lower cost).

Accessing the cloud is nevertheless a problem due to the wide variety of devices that can connect into the network. It will be solved in the mass market because the cloud is focus on the consumer and not on the devices, but in the **HealthCloud** environment vendors with proprietary protocol devices want to increase the mean life of their product which might be a real problem. I doubt that institutions such as "Health Care Alliance" providing connectivity solution by giving a certification label will be the ultimate goal. My understanding is that we have to reach a common standard such as the IEEE 1415 plug & play smart sensors or the IEEE 1394 plug and play connector to be considered a *sine quanon* requisite to pass the quality

label to be used as medical device starting by type I MD (medical device).

E. Training

After the integration of services in a Cloud, training in term of costs and time is relevant in various aspects: training to understand the cloud and their components, training on how you interact with your costumer, training in interoperability, performance and finally reliability.

III. PRIVATE AND PUBLIC CLOUD

An essential item to understand is the difference and the need for a public or a private cloud.

The main goal of the Cloud by itself is to be public and through Internet by definition, but it is true that there are items that have to be maintained in **private** for several *mission critical issues* (privacy of data, sensitivity of measurements or laboratory issues, regulatory issues etc..). If this is the case one has to consider the management costs in the private cloud. It is clear that public cloud is much more economic than private clouds that have to be settled and maintained in a private environment.

The lack of understanding of that item particularly from aggressive vendors coming from telecommunication companies to sell and manage their cloud infrastructure is outstanding. I have heard statements such as: “our cloud is extremely secure because we transmit and store all the data of the police regarding DNI in our cloud”. This is by law impossible.

Nevertheless, **where people put the data** is of paramount importance, including for the European Commission that is taking now a serious concern on data cloud management in EEUU servers due to the difference in data protection law in both continents.

The question raised is now: If you maintain it fully private should this be called a Cloud?. The answer is that cloud is an easy way to build and maintain switched Ethernet infrastructure that can be handled in a private virtualized mode. Whether or not this should be also called a Cloud probably depends on how much public could be the customer interaction.

If there is a public cloud it is a Cloud.

Even if it is just private, cost investment and maintenance is reduced by a 50% using cloud structure and infrastructure whether or not you are in the Cloud (this means in a public cloud), because you are managing everything in a single platform with only one policy.

IV. CONCLUSION

Business readiness and technical readiness, mission critical data, volume of data and transactions, liability & security issues, are the core concerns we have to deal to enter into the cloud infrastructure.

Taking into account the economic constraints that we are facing in the EU, Cloud computing and crowdsourcing are mandatory to be present in any healthcare organization.

The former is essential to manage a common healthcare all over the various AACC in Spain in order to have the

same opportunities regardless the autonomous community you live or travel.

The latter is just a new way to take advantage of others experience through Internet, allowing people that you do not know to help you.

In fact I would like the Ministry of Health considers both initiative to modernize Health Care and medical training.

REFERENCES

- [1] Cooper, C. (March 16, 2009). Cloud Computing: How we got here. Retrieved on April 05, 2009 from [http://news.cnet.com/8301-10787\\_3-10196859-60.html](http://news.cnet.com/8301-10787_3-10196859-60.html).
- [2] Halal, W. & Kadtke, J. (April 11, 2011). Cloud Computing. Techcast. Retrieved on April 13, 2011 from <http://www.techcast.org/BreakthroughAnalysis.aspx?ID=109>
- [3] Jeff Howe (June 2006). "The Rise of Crowdsourcing". Wired 14. <http://www.wired.com/wired/archive/14.06/crowds.html>
- [4] Mell, Peter & Grance, Tim (October 7, 2009). The NIST Definition of Cloud Computing. Retrieved on April 08, 2011 from <http://csrc.nist.gov/groups/SNS/cloud-computing/cloud-def-v15.doc>.
- [5] Smith, D. M. (April 1, 2011). Key Issues for Cloud Computing, 2011. Gartner. Retrieved on April 15, 2011 from <http://my.gartner.com/portal/server.pt?open=512&objID=260&mode=2&PageID=3460702&resId=1616314&ref=QuickSearch&stkw=cloud+computing>
- [6] IBM SPSS <http://www-01.ibm.com/software/analytics/spss/products/statistics/>
- [7] New cloud strategy to reform EU on line market. <http://euobserver.com/871/115008>
- [8] <http://www.microsoft.com/privatecloud>
- [9] Potter D. Smart plug and play sensors. IEEE 5, n 1: 28-30, 2002. <http://ieeexplore.ieee.org/Xplore/login.jsp?url=http%3A%2F%2Fieeexplore.ieee.org%2Fiel5%2F5289%2F21292%2F00988736.pdf%3FarNumber%3D988736&authDecision=-203>
- [10] The Office 365 trust center. [http://www.microsoft.com/en-us/office365/trust-center.aspx#fbid=8kbZ9t3o52\\_?Transparency](http://www.microsoft.com/en-us/office365/trust-center.aspx#fbid=8kbZ9t3o52_?Transparency)



**O.Ferrer-Roca MD, PhD.** Born in Barcelona, studied Medicine in the Central University of Barcelona from 1966-1972 with Honors. Got the PhD with “Cariotyping and tissue culture of tumors” in 1974 with Honors. Specialized in Pathology in 1974 being trained in Paris, Milwaukee-USA and London.

Working as pathologist in the Clinic Hospital of Barcelona since 1972 got the Assistance Professorship in Pathology in 1974 and the Chair of Pathology of the University of La Laguna in 1982. Commercialized a pathology image analysis system TEXCAN ®™ specialized in visual textural analysis of the cell chromatin and DNA and immunohistochemical quantification. Founded the CATAI association in 1993, being the president since then. Got the UNESCO Chair of Telemedicine in 1999 for the University of La Laguna. Since 1996 train on Telemedicine the students of medicine and Computer Science, creating the European Master of Telemedicine and Bioengineering applied to Telemedicine in 2004, at distance.

Editor of 8 books and 202 Publications is the author of the first textbook of Telemedicine *Handbook of Telemedicine*. Amsterdam: IOS-Press, 1998, containing the Ontology of Telemedicine