The EU China health cloud project towards open science in the 21st century

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Abstract: The EU China Health Cloud proposal contributes to the aims of the Research Infrastructures part of the EU Seventh Framework Program (FP7) by promoting cloud computing between the European and the China. The project, with a total number of 16 partners coordinated by ISTIC, started on July 1st 2012. It will disseminate the knowledge about the health cloud infrastructure, organize specific training events and support applications both within the scientific communities with an already long experience in the Computing Clouds (Population and Health, Bioinformatics and Biometrics, Computational Chemistry) and in the most recent ones (Aged care, Traditional Chinese Medicine, Clinical Medicine). Ultimately the EU China Health Cloud project will pave the way towards a common e-Infrastructure with the European and the China Clouds.

Keywords: Cloud Computing

1. Introduction

The EU China Health Cloud project aims to provide specific support actions to foster the integration of the Cloud infrastructures between Europe and the China region for the benefit of the many diverse scientific communities that have active partners in both continents. EU China Health Cloud will act as a support action, aiming to define and implement a policy to promote the ontology middleware developed within the China NSDSPH project (Su, 2010) across Asian countries. The dissemination in Asia of the knowledge about NSDSPH

infrastructure, middleware and services aims to attract those research and education communities that require the analysis of large quantities of data, need huge amounts of computing power, or are looking for tight international collaborations to utilize shared resources. Training of these communities and support for their applications will allow them to make use of a much larger pool of storage and compute resources than currently available in non-Cloud environments. EU China Health Cloud main actions will be to spread dissemination, provide training, sup-port scientific applications and monitor the results. These activities will take place in synergy with the other Cloud initiatives in China (Su, 2011).

The roadmap to reach the mentioned objectives can be outlined as follows:

1. Promote awareness in the Asia-pacific countries of the NSDSPH infrastructures, middleware and services by means of public events and written and multi-media material.

2. Capture local e-Science user requirements in terms of resources needed, Cloud services, application software, and training needs.

3. Identify and engage scientific communities that can benefit from the use of state-of-art Cloud technologies.

4. Provide training resources and organize training events for potential and actual Cloud users.

5. Support the scientific applications and create a human network of scientific communities by building on and leveraging the e-Science Cloud infrastructures.

The remainder of this paper will summarize the current state of the art about Health, describes this system in the NSDSPH Program, and then provide user and service platform in more detail.

2. Partners

The EU China Health Cloud project partners, listed in Table 1, come mainly from the China region. ISTIC, profiting from the long experience in Cloud operations, dissemination and training is the coordinator partner. ASGC plays an essential role, leveraging on his role of ROC in the Asia Pacific region for the NSDSPH infrastructure.

Table1. the EU China Health Cloud Project Partners.

Beneficiary Name	Country
University of Southern Queensland	Australia
University of Arkansas at Little Rock	USA
Centre for Global eHealth Innovation, University of Toronto	Canada
York University	Canada
Cambridge Healthcare	UK
Independent Manalgemient Group	Australia
O+Berri, Instituto Vasco de Innovación Sanitaria	Spain
Universidad de Castilla La Mancha	Spain
Université Paul Cézanne Aix-Marseille 3	France
Karolinska Institute	Sweden
School of Life, Beijing Institute of Technology	China
Beijing University of Chemical Technology	China
Beijing Jiaotong University	China
Hangzhou Normal University Medical College	China
Institute of Scientific and Technical Information of China	China
Changzhou Population and Family Planning	China

3. Scientific Applications

The main applications that are being supported on the NSDSPH infrastructure by the EU China Health Cloud project are coming from the following scientific domains:

3.1. Population and Aged care:

Ageing societies are considered to be those countries or regions that have either 10% of the population that are 60 years of age or older or 7% that are 65 years of age or older. China is rapidly becoming an ageing society [3].

Ageing in China has seen an expansion of the pension service, and an increasing number of groups and organizations involved in the provision of care and other services to the elderly. China's Finance Newspaper reported in 2008 that in the Chinese urban residential aged care service and care services industry, the potential value of the market had risen to more than 70 billion Yuan RMB. It is expected to increase to 130 billion Yuan in 2012, and in 2020 will be more than 500 billion Yuan.

3.2. Basic Medicine:

Basic Medicine is the field of applied science and the art of healing. It encompasses a variety of health care practices evolved to maintain and restore health by the prevention and treatment of illness in human beings. Institute of Basic Medical Sciences applies health science, biomedical research, and medical technology to diagnose and treat injury and disease, typically through

medication or surgery, but also through therapies as diverse as psychotherapy, external splints & traction, prostheses, biologics, ionizing radiation and others (Mitzner & Dijkstra, 2011).

3.3 Clinical Medicine:

Quantifying the relative performance of individual scholars has become an integral part of decision-making in research policy. The objective of the present study was to evaluate if the scholarship rank of China and EU for Scientific and Technological Development researchers in Medicine is consistent with their scientific productivity. Scholarship category was the variable of interest. Other variables analyzed were: time since receiving the doctorate, teaching activity (undergraduate, masters and doctoral students), number of articles published, and number of papers indexed by the Institute for Scientific Information (ISI) and Scopus databases.

3.4 Public Health:

Modern public health practice requires multidisciplinary teams of professionals including physicians specializing in public health/community medicine/infectious disease, epidemiologists, biostatisticians, public health nurses, medical microbiologists, environmental health officers, dental hygienists, dietitians and nutritionists, health inspectors, veterinarians, public health engineers, public health lawyers, sociologists, community development workers, communications officers, and others (Zasada et al., 2011; Klaoudatou, et al., 2011).

3.5 Traditional Chinese Medicine:

Traditional Chinese Medicine's view of the body places little emphasis on anatomical structures, but is mainly concerned with the identification of functional entities (which regulate digestion, breathing, aging etc.). While health is perceived as harmonious interaction of these entities and the outside world, disease is interpreted as a disharmony in interaction. TCM diagnosis consists in tracing symptoms to an underlying disharmony pattern, mainly by palpating the pulse and inspecting the tongue (Matsuura, et al., 2012).

3.6 Pharmacy:

The scope of pharmacy practice includes more traditional roles such as compounding and dispensing medications, and it also includes more modern

services related to health care, including clinical services, reviewing medications for safety and efficacy, and providing drug information. Pharmacists, therefore, are the experts on drug therapy and are the primary health professionals who optimize medication use to provide patients with positive health outcomes.

4. Dissemination and training

A web site http://www.EUChinaHealthCloud.eu and wiki pages for each work package has been setup not only to allow easy communication within the project, but also to disseminate the interest in the NSDSPH infrastructure in the Asia Pacific region. Furthermore EU China Health Cloud is participating to a large number of national and international workshops and conferences with stands, dissemination materials, posters and oral presentation to reach a wide audience.

While dissemination provides a general picture of the project, training provides de-tailed technical information to the potential users and gives them the skills to use the Cloud computing infrastructure allowing them to learn and practice. The targets of the training events are:

1. Technical personnel, to enable them to manage the e-Infrastructure and the user applications by using the Cloud tools effectively;

2. Users of the scientific applications, to foster the use of the Cloud e-Infrastructure by the scientific communities in the Asian countries.

The e Quality Health infrastructure (SU & BOUCELMA, 2011), developed by ISTIC and France, is the main tool used for training. Training events will be collocated with already scheduled conferences and enable effective and accurate decision making in the context of disasters. We identify the most important issues regarding the quality evaluation and we proposed several solutions, following the SOA paradigm

Both dissemination and training activities have to cope with large cultural and linguistic diversities as well as very different levels of engagement in the Cloud activities in the different countries within the Asia Pacific region.

5. Conclusion

Taking advantage of the NSDSPH Cloud e-Infrastructure, the EU China Health Cloud project will encourage federating approaches across scientific disciplines and communities by means of resource sharing and cooperative work among researchers in Europe and in the Asia Pacific region.

Acknowledgments

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