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ENHANCED MULTI -USER BASED DATA SHARING WITH HIGH SECURITY CLOUD SYSTEM

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Abstract
Cloud computing is an emerging computing technology that uses the internet and central remote servers to maintain data and applications.Enhanced Multi-user based Clinical Document Architecture (CDA) Data sharing with High Security Cloud System is still not in existing. In the existing system, only checking Integration for Health Information has been proposed. To overcome this drawback the proposed model has the enriched features of Secured Cloud data Storage, Dynamically changing group members, file Security, and user revocation modules.

Keywords: Clinical Document Architecture

1. Introduction

Cloud computing refers to applications and services offered over the internet. These services are offered from data centres all over the world which collectively arereferred to as the "cloud".Cloud computing means that instead of all the computer hardware and software by just sitting on the desktop, or somewhere inside the company's network, it provides *as a service* by another company and accessed over the Internet, usually in a completely seamless way. Cloud computing is a buzzword that means different things to different people. For some, it's just another way of describing IT (information technology) "outsourcing"; others use it to mean any computing service provided over the Internet or a similar network. Cloud computing services offer healthcare providers health plans and other healthcare organizations significance information technology savings and increased scalability. However not all cloud providers are created alike risk need to be managed and operational integrity as well as data security needs to be maintained**.** Most of the previous schemes studied about storing the data. The system better Performance and reliable among Cloud users. Miserably, cloud based secured data sharing with a multi-owner feature with secured data sharing is till today found as a challenging task. Data are sharing between doctors and owner using key distribution. This paper organized as follows: In Section1 describes Introduction.Section1 describes Related work. Section3 describes Research Directions. Section4 describes Discussion. Section 5 describes Conclusion and Section 6 describes References

2. Related works

2.1 Security Enhancement of Health Information Exchange

The Author **D.PadminiBai[1],P.Preethi[2]**has proposed the concept of CDA document generation and integration Open API service based on cloud computing, through which hospitals are enabled to conveniently generate CDA documents without having to purchase proprietary software. CDA document integration system integrates multiple CDA documents per patient into a single CDA document and physicians and patients can browse the clinical data in chronological order. In proposed work is providing security to the CDA document and a unique identity (id) is generated and given to the patients for avoiding the interchanging and duplication of medical reports. Every detail in CDA Document is Encrypted and stored in Database. All Details in CDA Document is secured using various Security Algorithms. Health Level Seven has established CDA (Clinical Document Architecture) as a major standard for clinical documents. CDA is a document markup standard that specifies the structure and semantics of „Clinical documents‟ for the purpose of exchange CDA generation software is not centralized and it is platform dependent. So an open API is developed to process the CDA document. For Example, if the document is create under Windows platform, Separate cost is needed to process the document in Java platform. Moreover, duplicate records for same patient can be generated. Medical Record is confidential about the Patient. But the security to the Medical record is not provided. There is a possibility of interchanging of patient‟s document in case of lag knowledge about the documentation process. Missing of documents while collecting it from a patient. The healthcare providers don't take care to the patient after discharge. The HIS development platforms for hospitals vary so greatly that generation of CDA documents in each hospital invariably requires a separate CDA generation system. Also, hospitals are very reluctant to adopt a new system unless it is absolutely necessary for provision of care. As a result, the adoption rate of EHR is very low except for in a few handful countries. Unfortunately for now, a solution that integrates multiple CDA documents into one does not exist yet to the best of our knowledge and there is a practical limitation for individual hospitals to develop and implement a CDA document integration technology.Here security for medical records were provided for both doctors and patient by generating the CDA document.

2.2 Clinical data interoperability based on archetype transformation

The Author **Catalina Martinez Costa[1], Marcos Menarguez-Tortosa[2]** semantic interoperability between health information **sys**tems is a major challenge to improve the quality of clinical practice and patient safety. In recent years many projects have faced this problem and provided solutions based on specific standards and technologies in order to satisfy the needs of a particular scenario. Most of such solutions cannot be easily adapted to new scenarios, thus more global solutions are needed. In this work, they have focused on the semantic interoperability of electronic healthcare records standards based on the dual model architecture and we have developed a solution that has been applied to ISO 13606 and open EHR. The technological infrastructure combines reference models, archetypes and ontologies, with the support of Model-driven Engineering techniques. For this purpose, the interoperability infrastructure developed in previous work by our group has been reused and extended to cover the requirements of data transformation.Archetypes can be used to

define clinical concepts such as heart rate, a laboratory test, and a blood pressure measurement. An archetype can be defined as a specialization of another one, can include another archetype fragment in it, can be used in combination with others by means of templates, and so on. They constitute a standardized way of capturing clinical data according to the archetype model, which provides the context for interpreting the clinical information.In dual model architectures, archetypes are considered the basic interoperability unit. Nowadays, there are several standards based on this architecture. In order to enable the information and knowledge sharing between them, transformation methods have been developed by our research group in recent years. Hence, this work aims to offer mechanisms that help the adoption of dual model architectures, by providing mechanisms for the exchange of clinical information between different standards. More concretely, we have addressed in this work the transformation of archetyped-data between ISO 13606 and open EHR. The present work reuses some of our previous results, such as the ontological infrastructure the ADL to OWL transformation tool and the archetype transformation method . Finally, it should be pointed that, although the dual model architecture is mainly used for the interoperability of EHR information systems, it might be used in other domains for which an information model can be defined and the domain concepts can be defined by constraining the entities of that information model. In that case, our methodological approach could be applied for the semantic interoperability of standards for such domains, for instance, for exchanging bank or billing records. In this case, the ontological infrastructure and theontological infrastructure and the mappings should be defined for the corresponding standards.

2.3 Information persistence services designed to support home care

The Author Nelson **Pacheco Rocha[1], Alexandra Queirós[2], Filipe Augusto[3]**has provided the concept of Home care services which require cooperation between different actors, including health and social caregivers, care receivers,and their informal caregivers (eg, relatives or friends), across time, space, and organizational boundaries. Therefore, it is foreseeable that eHealth services can contribute to their improvement. The aim of this study is to evaluate information persistence services based on the Reference Information Model (RIM) of the Health Level Seven (HL7) version 3 to support formal caregivers, both health and social care providers,and informal caregivers in the context of home care services. Since health and social care systems need to adequately meet new demand patterns, eHealth services can contribute to better allocation and management of the available resources, in accordance with the needs of citizens and of the organizations providing care services. However, most existing eHealth services have been developed with the prevalent paradigm of the discrete specialization of clinical activities and, therefore, there is the need to overcome their fragmentation. Concepts such as Medicine 2.0, connected health, or holistic health promote citizen-oriented and holistic solutions to manage mutual awareness and shared objectives among care receivers and formal and informal caregivers. This requires an effective cooperation not only among health care and social care providers, but also among formal and informal care givers, which is complex due to the lack of unified models, concepts, and terminologies. Therefore, the challenge exists to develop transversal information objects (ie, information objects to comply with wellness

issues and to accommodate information generated by the care receivers or their informal caregivers, including information resulting from innovative monitoring devices) with meanings that must be the same regardless of the organizational, logistical, or cultural differences of the actors involved. Consequently, the information persistence services should be able to contribute to the systematization of models, concepts, and terminologies and to combine new and existing types of information objects to allow coherent information support for each care receiver. The objective of the last phase of the pilot study will be to allow information access not only to formal care givers, but also to care receivers and their informal caregivers. In terms of research, this will be an opportunity to further develop individualized health and social care services delivery. This includes mechanisms to integrate information provided by formal and informal caregivers, reasonable accommodation of individual choice, efficient teamwork involving formal and informal caregivers, and mechanisms to surpass the difficulties resulting from low levels of digital literacy, which is a major problem considering the target users.The study contributes, with integrated solutions, to the persistence of care receivers information required to support home care services. This is relevant because the research efforts related to the use of technological services to support individuals in their natural environment should not just consider new ways of collecting information. It should also consider their informal caregivers, both in technological and organizational terms.

2.4 HL7 Clinical Document Architecture

The Author **robert h. dolin[1], md, lioraalschuler[2], sandy boyer[3]**has proposed the concept of HL7 Clinical Document Architecture. A CDA document is a defined and complete information object that can include text, images, sounds, and other multimedia content. It can be transferred within a message and can exist independently, outside the transferring message. CDA documents are encoded in Extensible Markup Language (XML), and they derive their machine processable meaning from the RIM, coupled with terminology. The CDA R2 model is richly expressive, enabling the formal representation of clinical statements (such as observations, medication administrations, and adverse events) such that they can be interpreted and acted upon by a computer. On the other hand, CDA R2 offers a low bar for adoption, providing a mechanism for simply wrapping a non-XML document with the CDA header or for creating a document with a structured header and sections containing only narrative content. The intent is to facilitate widespread adoption, while providing a mechanism for incremental semantic interoperability. The HL7 CDA is a document markup standard that specifies the structure and semantics of a clinical document (such as a discharge summary, progress note, procedure report) for the purpose of exchange. A CDA document is a defined and complete information object that can include text, images, sounds, and other multimedia content. It can be transferred within a message, and can exist independently, outside the transferring message. CDA specifies the structure and semantics of clinical documents (such as discharge summaries, progress notes) for the purpose of exchange. The scope has expanded somewhat through usage (for instance, some implementations are using CDA to exchange laboratory reports or prescriptions), and a common question

relates to the distinction between an HL7 document and an HL7 message, and knowing which to use when. While there are gray zones, messages tend to be transient, trigger based, and nonpersistent,where as clinical documents have persistence, wholeness, and clinician authentication and are human readable. The Framework provided by the RIM and by CDA is a critical component of semantic interoperability, it is not sufficient, particularly given the lack of a global terminology solution, and the fact that each terminology overlaps with the RIM in different ways. As a result, it is possible to express a clinical statement in many ways, often with no ability for a computer to determine equivalency. Thus, while CDA R2 is highly expressive, the primary direction for the future will be to manage this potential for variability, by constraining and/or defining transformations between the allowable representations. Three activities within HL7 focusing on this next step include HL7 Templates, the HL7 Clinical Statement Model, and the HL7 Term Info project, all of which will complement CDA R2. HL7 Templates are a constraint on a balloted model, such as the CDA R2 object model. The project goal is to provide a mechanism whereby a group such as a professional society can define best practices, which can be expressed in a standard format and implemented atop the constrained model, guiding the collection of key data elements and providing additional validation.Whereas CDA R2 says that a document contains sections and that sections contain observations, a template might further constrain that a particular document has particular types of sections (e.g., if Clinical Document code represents a discharge summary, then there must be a nested section. code representing allergies and adverse reactions), or that a particular section contains particular types of observations (e.g., if section. code represents vital signs, then there must be a nested observation code representing blood pressure).The HL7 Clinical Statement Model is a collaborative project between several committees, whose focus is on harmonizing clinical statement requirements into a single model that can be used in many V3 specifications, such as CDA.

2.5 Ensuring access control in cloud provisioned health care systems

The Author **HemaAndal, Jayaprakash Narayanan** has proposed the concept of multi-tenant healthcare systems, which focuses on the protection of information against unauthorized access. As different tenants including hospitals, clinics, insurance companies, and pharmacies access the system, sensitive information should be provided only to authorized users and tenants. The requirements of access control for healthcare multitenant cloud systems and propose to adapt Task-Role Based Access Control with constraints such as least privilege, separation of duty, delegation of tasks, and spatial and temporal access. Healthcare is a dynamic complex environment with many participants including patients, nurses, lab technicians, researchers, receptionists, and IT professionals. Recently, the Health Information Technology for Economic and Clinical Health (HITECH) Act is established to convert nation's health care records to digital formats such as Electronic Health Record (EHR) to improve rapid transmission of medical information and making health care systems more efficient .To protect patient information from unauthorized access and comply with the Health Insurance Portability and Accountability (HIPAA) privacy and security rules, health care organizations need global policies for access to patient information. Access control of data should

be flexible and fine grained depending on the dynamic nature of the health care system as multiple entities will interact with the data. Access rights to resources must be granted to users only for the amount of time that is necessary. It adapted the concept of Task-Role-Based Access Control, which considers the task in hand and the role of the user. It supports both workflow based and non-workflow based tasks and authorizes subjects to access necessary objects only during the execution of the task. In order to synchronize the workflow with the authorization flow, we adapt the Workflow Authorization Model. For example, let's assume a patient with acute abdominal pain is admitted to the emergency department and the patient is assigned to an intern on duty. The workflow is initiated once the patient is admitted. The intern first checks the patient's medical history and performs physical exam. The intern may order some lab tests or may ask another specialist's opinion. The workflow concludes with writing diagnosis on the patient's record. In role-based access control *(*RBAC*)*, access rights are associated with roles, and users are assigned to appropriate roles. It shows the basic components of role-based access control, i.e., user, role, session and permission. Role Hierarchy allows the senior role to inherit from junior roles. This model has been considered in health systems. Being a passive access. Control model, role-based access control fails in capturing dynamic responsibilities of users to support workflows, which need dynamic activation of access rights for certain tasks. In determining access control mechanism many factors need to be considered including users, information resources, roles, tasks, and workflow and business rules. The following are the factors important to healthcare cloud systems. **Tenant:** A tenant is a customer such as hospital, clinic, and pharmacy in the healthcare system. **User:** A user is either an employee of a tenant or a patient of the healthcare provider. Users are subjects of the access control. Each tenant has multiple users which include patients, doctors, nurses, and technicians. **Task:** A task is a fundamental unit of business activity. Tasks are assigned to users based on the role they have and their access rights are determined for fulfilling assigned tasks. **Information Resource:** Information resources are the objects of access control and include files and databases. **Business Role:** Business role is provided to each user based on the business activities they perform in the organization. A role links a user to certain tasks providing access rights to needed information resources. **Permission**: Permission is the authorization to perform an operation on an object. This model provides flexible access rights which are modified dynamically as tasks change. It also uses fine grained constraints such as task and user constraints in addition to scope level for each tenant.

2.6 CDA Generation and Integration of Health Information Exchange System Based on Cloud Computing

The Author **Sung-HyunLee[1],Joon Hyun Song[2] and II Konkim[3]** has proposed Successful deployment of Electronic Health Record which helps to improve patient safety and quality of care, but it has the prerequisite of interoperability between Health InformationExchange at different hospitals. The Clinical Document Architecture (CDA) developed by HL7 is a core document standard to ensure such interoperability, and propagation of this document format is critical for interoperability. Unfortunately, hospitals are reluctant to adopt interoperable HIS due to its deployment cost except for in a handful countries. A problem arises even

when more hospitals start using the CDA document format because the data scattered in different documents are hard to manage. The CDA document generation and integration Open API service based on cloud computing, through which hospitals are enabled to conveniently generate CDA documents without having to purchase proprietary software. The CDA document integration system integrates multiple CDA documents per patient into a single CDA document and physicians and patients can browse the clinical data in chronological order. This system of CDA document generation and integration is based on cloud computing and the service is offered in Open API. Developers using different platforms thus can use our system to enhance interoperability.Effective health information exchange needs to be standardized for interoperable health information exchange between hospitals. Especially, clinical document standardization lies at the core of guaranteeing interoperability. It takes increasing amount of time for the medical personnel as the amount of exchanged CDA document increases because more documents means that data are distributed in different documents. This significantly delays the medical personnel in making decisions. Hence, when all of the CDA documents are integrated into a single document, the medical personnel is empowered to review the patient's clinical history conveniently in chronological order per clinical section and the follow-up care service can be delivered more effectively. Unfortunately for now, a solution that integrates multiple CDA documents into one does not exist yet to the best of our knowledge and there is a practical limitation for individual hospitals to develop and implement a CDA document integration technology. The HIS development platforms for hospitals vary so greatly that generation of CDA documents in each hospital invariably requires a separate CDA generation system. Also, hospitals are very reluctant to adopt a new system unless it is absolutely necessary for provision of care. As a result, the adoption rate of EHR is very low except for in a few handful countries. Unfortunately for now, a solution that integrates multiple CDA documents into one does not exist yet to the best of our knowledge and there is a practical limitation for individual hospitals to develop and implement a CDA document integration technology. To establish Confidence in HIE interoperability, more HIS's need to support CDA. However, the structure of CDA is very complex .And the production of correct CDA document is hard to achieve without deep understanding of the CDA standard and sufficient experience with it. CDA document generation system that generates CDA documents on different developing platforms .And a CDA document integration system that integrates multiple CDA documents scattered in different hospitals for each patient.CDA Generation API generates CDA documents on cloud. CDA Generation Interface uses the API provided by the cloud and relays the input data and receives CDA documents generated in the cloud. **Template Manager** is responsible for managing the CDA documents generated in the cloud server. Our system uses CCD document templates. **CDA Generator** collects patient data from hospitals and generates CDA documents in the template formats as suggested by the Template Manager. **CDA Validator** inspects whether the generated CDA document complies with the CDA schema standard. Hospitals are reluctant to adopt interoperable HIS due to its deployment cost except for in a handful countries. A problem arises even when more hospitals start using the CDA document format because the data scattered in different documents are hard to manage.CDA

document generation and integration Open API service based on cloud computing, through which hospitals are enabled to conveniently generate CDA documents without having to purchase proprietary software. Our CDA document integration system integrates multiple CDA documents per patient into a single CDA document and physicians and patients can browse the clinical data in chronological order. Our system of CDA document generation and integration is based on cloud computing and the service is offered in Open API. Developers using different platforms thus can use our system to enhance interoperability.

3. Research directions

- The generation of CDA documents in each hospital requires a separate CDA generation system.
- Hospitals are very reluctant to adopt a new system unless it is necessary for provision of care.
- A solution that integrates multiple CDA documents into one does not exist yet.
- The quality of service with multiple users logged on to the system is not implemented.
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4. Discussion

1.In the Security Enhancement of Health Information Exchange the future work is to provide a security in upload a CDA Document and Download ,View the CDA Document and also the challenge to improve security while ensuring sensible superiority of service even with numerous users logged on the system at the similar time.

2.In the Clinical data interoperability based on archetype transformationthe dual model architecture is mainly used for the interoperability of EHR information systems, it might be used in other domains for which an information model can be defined and the domain concepts can be defined by constraining the entities of that information model. In that case, our methodological approach could be applied for the semantic interoperability of standards for such domains, for instance, for exchanging bank or billing records. In this case, the ontological infrastructure and theontological infrastructure and the mappings should be defined for the corresponding standards.

3.In the Information persistence services designed to support home care the research efforts related to the use of technological services to support individuals in their natural environment should not just consider new ways of collecting information. It should also consider the their informal caregivers, both in technological and organizational terms.

4.In the HL7 Clinical Document Architecture Model is a collaborative project between several committees, whose focus is on harmonizing clinical statement requirements into a single model that can be used in many V3 specifications, such as CDA.

5.In the Ensuring access control in cloud provisioned health care systems it supports both workflow based and non-workflow based tasks and authorize subjects to access necessary objects only during the execution of the task. In order to synchronize the workflow with the authorization flow, we adapt the Workflow Authorization Model.

6.CDA Generation and Integration of Health Information Exchange System Based on Cloud ComputingIn the existing system, both Security and Multi-user model features found missing. The data stored into cloud with checking Integration but not checking security.The data are sharing between hospital and doctors without using security. User revocation is not applied. Cloud based secured data sharing with a multi-owner feature with secured data sharing is till today found as a challenging task so, the data

sharing between doctors and owner using key distribution is stillnot implemented.

5. Conclusion

Interoperability between hospitals not only helps improve patient safety and quality of care but also reduce time and resources spent on data format conversion Interoperability is treated more important as the number of hospitals participating in HIE increases. When the number of hospitals that do not support interoperability, complexity for HIE increases.

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