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AN ONTOLOGY-DRIVEN CLOUD-BASED FRAMEWORK TO ENHANCE ELECTRONIC HEALTH RECORD (EHR) INTEGRATION IN SRI LANKA

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Abstract

Sri Lanka's healthcare sector faces persistent challenges in implementing a unified Electronic Health Record (EHR) system due to fragmented infrastructures, limited interoperability, and increasing demands for patient mobility. Existing platforms such as HHIMS operate in silos, restricting seamless data exchange and collaboration among healthcare stakeholders. This research proposes a novel ontology-driven, cloud-based EHR framework to enhance accessibility, semantic interoperability, and collaboration across Sri Lankan healthcare institutions. Using the Soft Design Science Methodology (SDSM), the study introduces a three-dimensional ontological model that captures stakeholder perspectives, healthcare information flows, and service process architecture. The ontology will be developed through stakeholder-based modeling and aligned with international health data standards such as HL7 FHIR, openEHR, and DICOM to ensure technical compatibility and semantic consistency. Unlike existing international implementations, this framework focuses on adaptability to low-resource environments and localization within the Sri Lankan healthcare context. Furthermore, ontology-based reasoning will enable AI and Machine Learning (AI/ML) applications for predictive analytics, such as disease trend forecasting and drug requirement estimation, enhancing evidence-based decision-making. A Proof of Concept (PoC) will be developed in collaboration with the University of Sri Jayewardenepura Medical Center and the ICTA's HHIMS system to validate its feasibility. The expected outcomes include improved interoperability, secure data sharing, and enhanced decision support, contributing to a scalable national EHR framework suited to Sri Lanka's healthcare ecosystem.

Keywords*: Electronic Health Records, Ontology, HL7 FHIR, Interoperability, Cloud Computing, Sri Lanka, HHIMS*