

Homogeneity-driven technology independence in HL7 paradigms

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Abstract

Semantic Interoperability (SI) is key in all *Information Technology* based healthcare information exchange amongst participating enterprises. It is the regulated, meaningful exchange and access to valued healthcare information. Coined *International Interoperability* herein, *SI* is the principle goal of this study. The predominant exponent of *SI* is *Health Level Seven* (HL7) v3, a global healthcare standard in operation today. It was determined that infusing simplicity and uniformity in the labyrinths of the *HL7* sub-processes would derive optimal *analytic* and *design interoperability*. Even allied activities such as domain requirements cross-checking, stakeholder consensus, and audit, will be significantly enhanced by this process. The *HL7* v3 development process consisting of *Messages*, *Clinical Document Architecture* (CDA), and *Services*, is presently modelled using the *Extended Markup Language* (XML) which actually introduces *wordiness*, *non-uniformity*, and *ambiguity* into the *HL7* specifications development paradigm. Introduced in 1996, it is best used for formatting documents, making them human and machine readable, and also web-ready. Its primary purpose and focus is data presentation and reporting, less modelling *complex* ontological and information architectures. Our proposed solution remodels all such artifacts using the newly devised *Unified Data Atom* (UDA⁺) vocabulary creating *overarching homogeneity* across all three *HL7* paradigmic *landscapes*. It has also been proved in this study that the transformation from *XML* to *HL7* vocabulary is equivalent and complete, meaning that the transformation is syntactically equivalent, semantically precise, and complete. Working towards directly inducing *inter-paradigmatic* (ie., *Messages*, *Documents*, and *Services*), *Reference Information Model* (RIM), or *HL7 Ontology* related efficiencies and enhancements generates meagre returns, since these top-level interfaces have been researched and any benefits already accrued and utilized. Further, the use of multiple ontological and informational-structure related modelling technologies

such as *Web Ontology Language* (OWL), and *XML* actually subvert interoperability and communication processes in the *HL7* specifications development paradigm. This paper however focused on excavating and capitalizing on the abounding interoperability potential afforded by core *paradigm-related* specification development sub-processes. *UDA*⁺-modelled artifacts accrue *inclusive* benefits of simplicity, brevity, and versatility over the previous *XML* representation. True sub-process interoperability during design and development is achieved, promoting high-calibre, *internationally-interoperable* and *inclusively-efficient* system development. Principally significant is that *analysis and design interoperability* amongst all stakeholders also derived, actualizing overarching, ubiquitous exchange.

Keywords: International interoperability, Extended Markup Language, ontology, *UDA*⁺.