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Arden Syntax on FHIR

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Abstract. Arden Syntax, a medical knowledge representation and processing language for clinical decision support tasks supervised by Health Level Seven International (HL7), was extended with HL7's Fast Healthcare Interoperability Resources (FHIR) constructs to allow standardized data access. The new version, Arden Syntax version 3.0, was successfully balloted as part of the audited, consensus-based, iterative HL7 standards development process.

Keywords. HL7, Arden Syntax, FHIR

1. Introduction

Arden Syntax [1] is a medical knowledge representation and processing language used to write clinical knowledge in computerized form. It is supervised by Health Level Seven International (HL7) and has been continuously developed by its Arden Syntax Work Group [2],[3]. Clinical decision support (CDS) tasks of varying complexity can thus be formulated and – by using Arden-Syntax-based software – processed in clinical environments. At time of its initial development [4], high emphasis was placed on the readability of Arden-Syntax-written clinical knowledge – a property that was and still is beneficial for the interdisciplinary work between clinicians and knowledge engineers during knowledge authoring. However, access to medical data from Arden Syntax has been problematic because of lack of a standardized patient data model. In recent years, HL7's Fast Healthcare Interoperability Resources (FHIR) has matured as a standard data model [5]. This data model offers a library of structured resources to standardize references to clinical data and their transmission. It now has been incorporated into the Arden Syntax in version 3.0 to aid sharing of computable knowledge by standardizing references to execution-site data.

2. Methods

The Arden Syntax Work Group recognized this opportunity [6] and extended the current, normative standard (Arden Syntax version 2.10) by including FHIR constructs

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in the language. These allow direct reference to FHIR for data queries and to standard value sets for specifying query parameters. Use cases representing typical CDS knowledge representation and clinical processing tasks were employed to validate the new constructs.

3. Results

The extension of Arden Syntax by supporting FHIR constructs as a standard data model was successfully carried out. An example is the assignment operator now expanded with direct references to externally-maintained value sets; another example is the refinement of the READ statement to allow the use of dot notation to identify subparts of FHIR profiles and to align the output of a FHIR-based query with Arden Syntax local data objects. The new Arden Syntax, version 3.0, was reviewed through the official HL7 balloting process, which is part of the audited, consensus-based, iterative HL7 standards development process. At present, revisions that came up during the review process by the HL7 community are being dealt with. Reconciliation will soon be finished.

4. Discussion and Conclusions

The revised Arden Syntax, version 3.0, will be published this year once the ballot and review processes are completed. An extended comparison of Arden Syntax and Clinical Quality Language (CQL), a further HL7 standard for medical knowledge representation, is reported in [7]. The comparison shows that both Arden Syntax and CQL have similar constructs that can be used for representing CDS knowledge but also have unique constructs that could support distinct use cases.

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